ORANGE COUNTY SOIL AND WATER CONSERVATION DISTRICT



LOST RIVER WATERSHED FINAL WATER QUALITY MONITORING STUDY



V3 Companies September 2006

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1.0 EXECUTIVE SUMMARY

V3 Companies, Ltd (V3) has conducted the Lost River Watershed Final Water Quality Monitoring Study for the Orange County Soil and Water Conservation District (SWCD). Exhibit I shows the Project Vicinity. There are ten sampling stations for evaluating the biological, physical and chemical condition of the watershed including: macroinvertebrate communities, instream and riparian habitat and water quality parameters. The watershed of the Lost River is within the karst regions surrounding Paoli, Indiana. The term karst implies the processes and phenomena associated with the dissolution of bedrock by water. Karst regions typically contain sinkholes, sinking streams, disrupted surface drainage, caves and underground drainage systems. This study includes sampling locations within surface riverbeds, underground caverns, swallow holes, gulfs, true-rises and drybeds of Lost River.

The Lost River watershed evaluated during this study is 106,980 acres. The portion of the river evaluated during this study has a linear river length of approximately 15.3 miles for perennial surface water in the upstream reaches, approximately 21.3 miles of linear length for intermittent drybeds, an estimated 7.5 miles of linear length for underground river systems, and another perennial surface water stream segment of approximately 25.8 miles for linear length in the downstream reaches. Beyond the watershed which was studied, there is approximately 20.5 miles linear length of the Lost River downstream of the studied area before the Lost River ends at it's confluence with the White River. This watershed study includes eight sampling stations on Lost River, one sampling station on South Fork Lost River and one on Carter's Creek. Of these locations, 4 were sampled for macroinvertebrates, 8 were sampled for water quality during baseflow conditions and 9 were sampled for water quality during stormflow conditions (see Exhibit II). This study follows the guidelines suggested by the Indiana Department of Natural Resources (IDNR) Lake and River Enhancement (LARE) Program. This study was funded by the IDNR's LARE program.

Land use best management conservation practices were implemented by the Orange County SWCD to improve the Lost River watershed from 2001 through 2005. The land use best management conservation practices included: winter cover crop, heavy use area feeding pads, spring development and acres pasture/hayland planting.

Prior to the implementation of the best management practices, there was no baseline study performed to establish the conditions of water quality, macroinvertebrate communities and habitat. The study performed by V3 in 2004 and 2005 will provide information on existing conditions for future comparisons, however, it does not allow for any current interpretation on the watersheds benefits from the implementation of these conservation practices. We will attempt to make comparison between the high flow and low flow sampling events, as well as station to station evaluations, in order to speculate on the effectiveness of conservation practices within the watershed. Macroinvertebrate monitoring and habitat evaluations were conducted using the methods provided by the U.S. Environmental Protection Agency. Habitat was evaluated by using the Qualitative Habitat Evaluation Index (QHEI). Water quality measurements recorded both in the field with water quality meters and in the laboratory.

V3 followed the LARE guidelines for sampling during high and low flow events. Low flow event water quality sampling was performed on June 29 and 30, 2004. Macroinvertebrate evaluation was also performed during this timeframe, as this fell within the LARE recommended late summer sampling season. The timing on high flow event samples were unable to be performed during the calendar year of 2004, however, on January 5 and 6, 2005 a stormevent contributed approximately 2.87 inches of rain from January 1-4 and 2.90 inches on January 5 (the first day of sampling) within the watershed (www.accuweather.com 2006). Local IDNR staff were present during all of the sampling events and assisted with the collection effort.

The biological evaluation of macroinvertebrate communities performed by V3 followed the multihabitat approach provided in the USEPA Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers, Periphyton, Benthic Macroinvertebrates and Fish, Second Edition, publication number EPA 841-B-99-002. The preference of the LARE program is to follow the single habitat approach as described within the above mentioned USEPA publication or the RBPIII protocol as it is described in the USEPA Rapid Bioassessment Protocols for Use in Streams and Rivers, Benthic Macroinvertebrates and Fish, publication number EPA/440/4-89/001. It is important for subsequent evaluations and comparisons to be aware of this data collection discrepancy.

The evaluation of macroinvertebrate communities within the watershed describe the biological health at a level which provides insight into point and nonpoint source impacts which otherwise may or maynot be able to be measured. All four of the evaluated stations posses a slightly impaired biological condition.

Habitat incorporates all aspects of physical and chemical constituents along with the biotic interactions. Habitat includes all of the instream and riparian habitat that influences the structure and function of the aquatic community in a stream. All four of the sampling stations evaluated for habitat during the Lost River Watershed Final Water Quality Monitoring Study resulted in Good habitat ratings.

Water quality analysis of the watershed during baseflow and stormflow events showed acceptable values with the following exceptions. Phosphorus levels were high at 1,2,3,4,5,7,8,9 and 10 during stormflow sampling in January 2005 and at 1,2,3,6,7,9 and 10 during baseflow sampling in June 2004. Nitrate was measured at high levels at both Stations 1 and 3 during the June 2004 sampling effort. The stations with the highest levels of *E coli* were baseflow conditions at Station 1 (6,300 cfu/100ml) along the South Fork Lost River and stormflow condition at both drybed sampling stations along Lost River, Stations 5 (4,800 cfu/100ml) and Station 8 (5,000 cfu/100ml). Stations 5 and 8 also shared the highest turbidity levels, Station 5 (80 NTU) and Station 8 (85 NTU).

In areas of good or excellent habitat, biological communities will reflect degraded conditions when water quality effects are present. This graph demonstrates a condition where organic pollution or toxicants will adversely affect biological condition regardless of the quality of the habitat.

Land use best management conservation practices have been implemented within the 106,980 acres of Lost River's evaluated watershed. We recommend the continued implementation of habitat focused watershed improvement measures within the entire Lost River watershed. We recommend that similar evaluations use the results of this study to make comparisons on the health trends of the macroinvertebrate, habitat and water quality conditions of the watershed.

2.0 ACKNOWLEDGEMENTS

We would like to acknowledge Frank Hodges (with IDNR at the time of V3's survey) for his assistance with historical data collection and field sampling efforts. We would like to acknowledge Treva Brim of the Orange County SWCD for her assistance with sampling efforts, her coordination of historical landuse data and her handeling of contracts. We would also like to acknowledge Cecil Rich (IDNR, LARE Program Biologist) for his guidance, review and comments.

3.0 INTRODUCTION

V3 has provided technical services to the Orange County SWCD in conducting the Lost River Watershed Post-Construction Monitoring Study in Orange County, Indiana. The Orange County SWCD has performed several land use conservation practices throughout the watershed to improve water quality conditions from 2001 to 2005. The Lost River is a very unique river. It is an underground river that flows through caves at depths up to about 150 feet below the surface. When the river comes to a blockage in the cave or enough volume is not flowing through the water flows to the surface and creates a "rise". Then the river flows on the surface until it finds a sinkhole and it flows back into the caves. In areas the river is completely underground during normal conditions. In a storm event the river rises and flows in river beds that are normally dry.

The majority of the studies 106,980 acre Lost River watershed (see Exhibit I) is within Orange County, with the downstream western most portions extending into Martin County and the upstream portion extending into Washington County. The portion of the river evaluated during this study has a linear river length of approximately 15.3 miles for perennial surface water in the upstream reaches, approximately 21.3 miles of linear length for intermittent drybeds, an estimated 7.5 miles of linear length for underground river systems, and another perennial surface water stream segment of approximately 25.8 miles for linear length in the downstream reaches. The underground portions of the river system are difficult to quantify as the majority of the system has not been mapped, and much of it has not been explored. There is approximately 20.5 miles linear length of the Lost River downstream of the studied area which was not included in this evaluation before the Lost River ends at it's confluence with the White River. This study follows the guidelines suggested by the IDNR LARE Program. The LARE program provided the funding to carry out the post-treatment monitoring study.

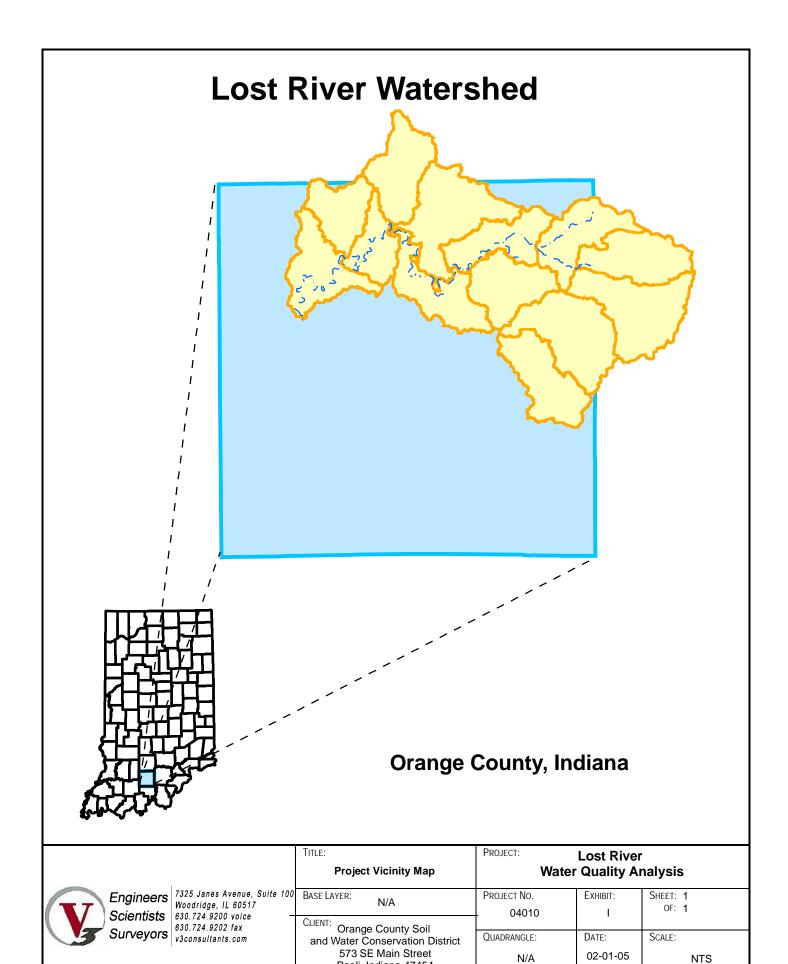
There are ten identified sampling stations that were monitored in the Lost River Watershed. There were three separate sampling efforts in this study. The baseflow sampling occurred on June 29 and 30, 2004; stormflow sampling occurred on January 5 and 6, 2005; and the biological sampling occurred on September 8 and 9, 2004. Stations 1, 2, 3 and 4 had all three sampling efforts performed during the study. Stations 7, 9 and 10 had baseflow and stormflow

measurements performed. Station 6 had only base flow measured because it is Tolliver Swallow Hole and was not assessable during storm flow. Stations 5 and 8 are dry beds and only have water in them during storm events so were only sampled during the storm flow. There was no reference station identified for the Lost River. It is difficult to identify ideal parameters for such an atypical river ecosystem within the karst regions. The study had been designed to omit the reference station, before V3 bid on the study. For purposes of making the USEPA evaluation within this report, we have created a representative reference condition. This representative condition was created by selecting the best recorded value for each of the evaluated conditions, and projecting an achievable condition for the system that is not specific to one location. All sampling stations are shown on Exhibit II.

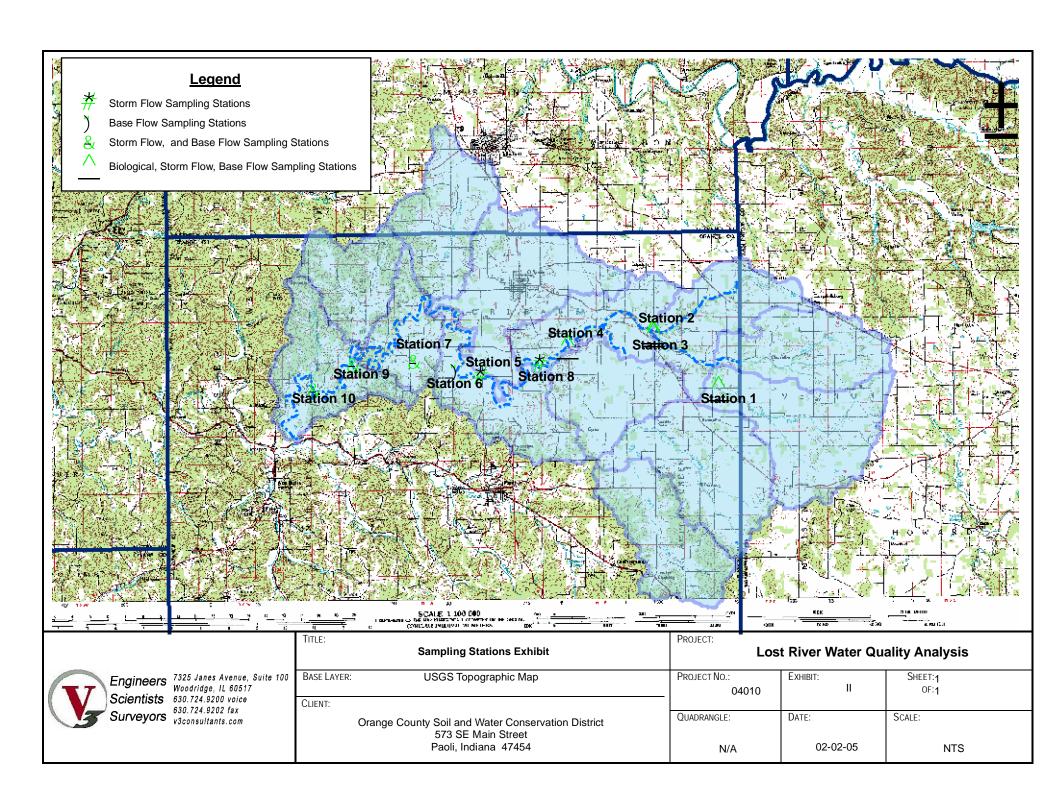
The Orange County SWCD has performed several land use conservation practices throughout the watershed to improve water quality conditions. Measurements of the proportions of land using conservation tillage practices were not available for comparison throughout the years since the previous monitoring study was conducted. Locations of Lost River's best management practices are shown in Exhibit III. The amount of winter cover crop used from 2001-2005 is shown in Table 1. Other best management practices implemented during 2005 included eleven heavy use area feeding pads, one spring development and 59 acres of pasture/hayland planting.

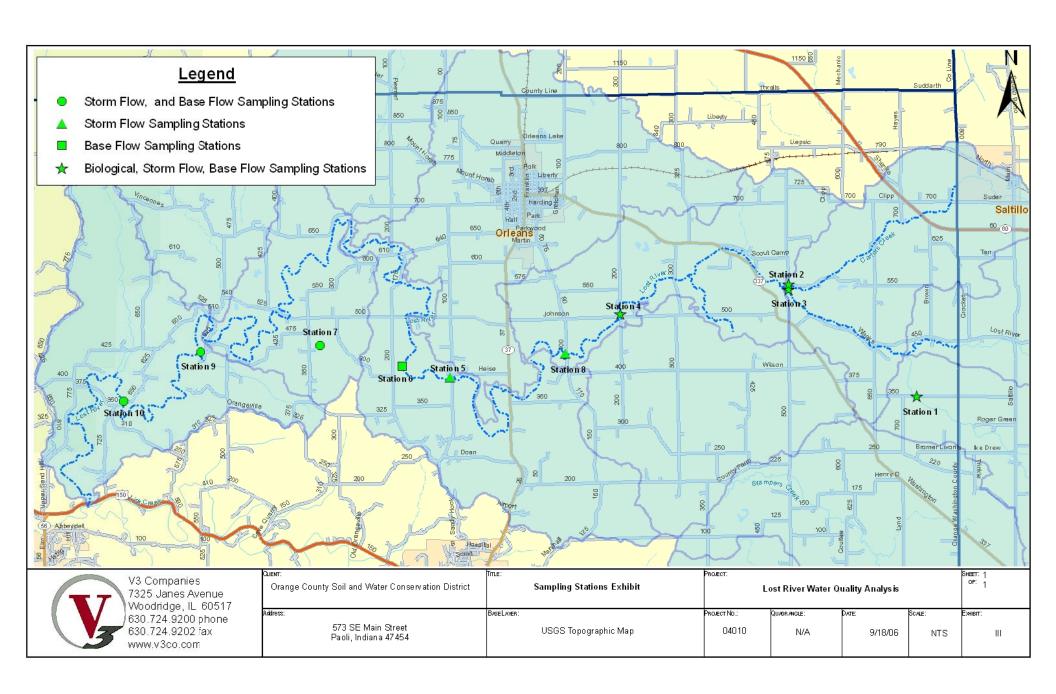
TABLE 1 – LOST RIVER WATERSHED, ACRES OF WINTER COVER CROP

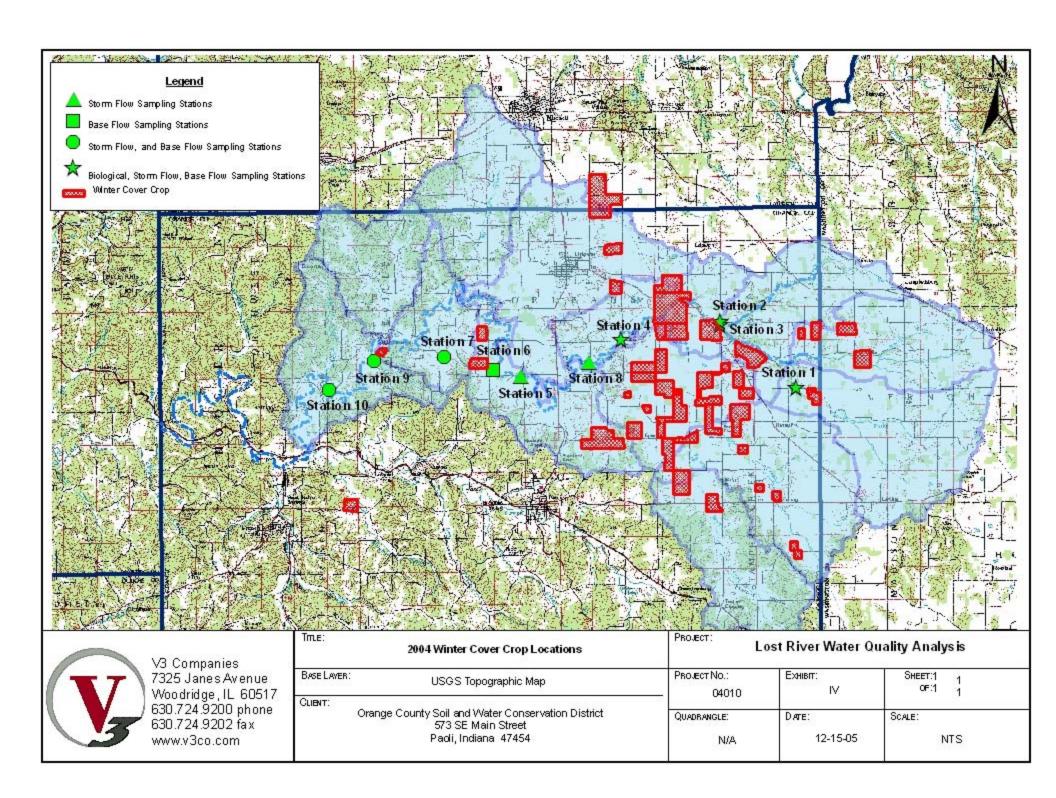
Year	Acres of Cover Crop
2001	1,500
2002	2,000
2003	3,000
2004	1,394.4
2005	641.3



Paoli, Indiana 47454







In 2004 and 2005, V3 performed the Final Water Quality Monitoring Study in accordance with the guidelines suggested by the IDNR LARE Program. V3 also performed the base flow, storm flow and biological sampling efforts within the LARE Program's designated timeframes, and as a direct result from discussions with regional IDNR staff and Orange County SWCD employees.

The Lost River watershed is in a predominantly rural agricultural and is approximately 106,980 acres upstream of sampling station 10. Lost River terminates at it's confluence with the East Fork of the White River. The thirteen different 14-digit hydrologic unit codes (HUC) for the Lost River watershed are 05120208150010, 05120208150020, 05120208150030, 05120208150040, 05120208150050, 05120208150060, 05120208150070, 05120208150080, 05120208150090, 05120208150100, 05120208150110, 05120208150120 and 05120208160010. All of the studies sampling stations are described in Table 2, and shown in Exhibit II.

TABLE 2 – LOST RIVER WATERSHED, SAMPLING STATIONS

	Waterway	Location	Sampling Efforts *	Watershed Area (acres)
Station 1	South Fork Lost River	CR 350 N	M,S,B	11,269
Station 2	Carter Creek	Tater Road	M,S,B	5,895
Station 3	Lost River	Tater Road	M,S,B	22,349
Station 4	Lost River	Fishers Ford Bridge	M,S,B	61,778
Station 5	Lost River	CR 100 W	S	68,730
Station 6	Lost River	Tolliver Swallow Hole	В	70,015
Station 7	Lost River	Wesley Chapel Gulf	S,B	95,599
Station 8	Lost River	Roosevelt Road	S	62,520
Station 9	Lost River	True Rise	S,B	105,004
Station 10	Lost River	Orangeville Road	S,B	106,980

M = macroinvertebrate

S = stormflow

B = baseflow

All of the stations were selected to provide interpretive data on the respective portions of the watershed. Stations 1-4 are the most upstream portions of the project and flow above ground year round so it was possible to take samples during all three of the efforts (baseflow, biological and stormflow). Stations 7, 9 and 10 are too deep for biological sampling, so only baseflow and stormflow data collection was possible, so the depth of the Wesley Chapel Gulf, True Rise and downstream most station on the mainstem of Lost River did not have an evaluation of macroinvertebrates. Stations 5 and 8 are drybeds with intermittent flow, so only flow under storm conditions was possible, no baseflow or macroinvertebrate data could be collected. Station 6 is below ground in a cavern, so collecting stormflow data would be dangerous and the macroinvertebrate community would be atypical as it is underground, therefore only baseflow sampling was performed.

4.0 METHODS

4.1 Biological Evaluation Methods

Macroinvertebrate monitoring followed the USEPA's Benthic Macroinvertebrate Protocol for the multihabitat approach. The multihabitat approach involves the systematic collection of benthic macroinvertebrates from all available instream habitats by kicking the substrate or jabbing with a dip net. A total of 20 jabs or kicks are taken from all major habitat types in the reach resulting in sampling approximately 3.1 m² of habitat. The collected organisms are sorted in the V3 laboratory and identified to the lowest practical taxon. The collection procedure provides representative macroinvertebrate fauna from all of the available instream habitats including riffle and run habitat types that provide representatives of scraper and filterer functional feeding groups, and Course Particulate Organic Matter (CPOM) such as detritus, leaves, needles, twigs, sticks, bark and other fragments that provide representatives of the shredder functional feeding group. Sources of CPOM include leaf packs, shorezones and other depositional areas.

Although the multihabitat approach is provided in the USEPA Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers, Periphyton, Benthic Macroinvertebrates and Fish, Second Edition, publication number EPA 841-B-99-002, the LARE program would have preferred that the study had followed the single habitat approach as described within that same publication or the RBPIII protocol as it is described in the USEPA Rapid Bioassessment Protocols for Use in Streams and Rivers, Benthic Macroinvertebrates and Fish, publication number EPA/440/4-89/001. The data from survey of the benthic macroinvertebrate community shortly after the implementation of the land use conservation practices would have been more readily compared to the data from this survey had the methodology been the same.

Although the reference station is often selected outside of the treatment watershed, it was thought that the atypical karst system of the Lost River did not translate accordingly to an ideal reference stream within a different watershed. In order to provide comparative analysis on the data gathered from this study, a hypothetical station was created using the best data from combining all of the sampling stations.

4.2 Physical Evaluation Methods

Habitat evaluation followed the Ohio EPA Qualitative Habitat Evaluation Index (QHEI) habitat assessment approach.

4.3 Chemical Evaluation Methods

Water quality analysis was measured in the field using an In-Situ Multi Parameter TROLL 9000, YSI Model 50B Dissolved Oxygen Meter, LaMotte 2020 Turbidimeter, and MARSH-McBIRNEY FLO-MATE Model 2000 Portable Flowmeter. V3 performed the water quality measurements for the following parameters: oxidation-reduction potential, temperature, conductivity, pH, dissolved oxygen, flow and turbidity. V3 also collected water samples for

water chemistry analysis in a laboratory for the following parameters: Ammonia, Nitrate, Nitrite, Total Kjeldahl (baseflow only), Dissolved Phosphorous, Total Phosphorous and *Escherichia coliform*.

5.0 RESULTS

5.1 Biological Evaluation Results

Appendix I contains the field and laboratory data sheets for the benthic macroinvertebrate communities. Appendix II contains the transmittal letter and photo-documentation from V3 to Purdue University, Department of Entomology which accompanied the thirty four (34) voucher specimens of macroinvertebrates collected during the 2004 study, as well as the response letter from Dr. Arwin Provonsha of Purdue stating that all 35 macroinvertebrates are accurately identified. Table 3 lists the macroinvertebrates that were collected during the September 8 and 9, 2004 sampling event at each of the four stations. Table 4 lists general data for the USEPA evaluation metric by sampling station.

TABLE 3 – BENTHIC MACROINVERTEBRATE COLLECTED BY STATION, APRIL 2004

ORDER	FAMILY	GENUS	SPECIES	STATION, AFRIL 2004 STATION NUMBER			
ORDER	FAIVIILY	GENUS	SPECIES	1	2	3	4
Tubellaria	Planaria			1	2	3	5
Pelecypoda	Corbiculidae	Corbicula	fluminea			1	
Gastropoda	Physidae			1			
•	Planorbidae						1
	Pleuroceridae			13	4	19	24
Annelida	Hirudinea						1
Decapoda				1	2	2	3
Amphipoda					10	3	2
Isopoda	Asellidae						2
Ephemeroptera	Baetidae			25	13	1	4
	Heptageniidae	Stenacron			2	3	
	Heptageniidae	Stenonema		16	1	4	7
	Isonychiidae	Isonychia		1		2	
Coleoptera	Haliplidae	, , , , , , , , , , , , , , , , , , , ,			1		
	Elmidae				9	10	12
	Psephenidae	Psephenus		4	7	20	15
Megaloptera	Corydalidae	Corydalus		1		1	
	Corydalidae	Nigronia			1	1	
Trichoptera	Helicopsychidae	Helicopsyche		1		6	8
•	Hydropsychidae			11	13	2	2
	Odontoceridae						1
	Philopotamidae	Chimarra		2	3	8	
Hemiptera	Belostomatidae						1
•	Gerridae			1	3	2	
	Veliidae	Rhagovelia		2			
Plecoptera	Perlidae	Claassenia		1	5	3	1
Odonata-							
Anisoptera	Aeshnidae			3	2	2	
	Corduliidae						1
Odonata- Zygoptera	Calopterygidae	Calopteryx		14	3	1	3
73-1	Coenagrionidae	Argia		† · ·	3	2	7
	Blood-red	3		1	1		
Diptera	Chironomidae			1	1		
	Other						
	Chironomidae			1	12	3	
	Culicidae				1		
	Tipulidae				2	1	
Total Number of	Individuals Evaluated			100	100	100	100

TABLE 4 – BENTHIC MACROINVERTEBRATE RESULTS, SEPTEMBER 2004

Parameter	Relative Reference	Station 1	Station 2	Station 3	Station 4
Total Number of Taxa	23	19	22	<mark>23*</mark>	19
Total Number of EPT Taxa	8	7	6	<mark>8*</mark>	6
Percent Contribution of Dominant Taxa	13	25	13*	20	24
Ratio of EPT/Chironomidae	57	<mark>57*</mark>	2.8	9.7	23/0
Modified Biotic Index	3.9	4.0	4.3	<mark>3.9*</mark>	4.2
Ratio of Scraper/Filterer	27.5	2.5	0.875	4.0	27.5*
Ratio of Shredder/Nonshredder	0.11	0.01	0.11*	0.03	0.04
Total Number of Individuals Evaluated	-	100	100	100	100

* indicates highest quality, used as reference station.

The best score from the four evaluated stations was assigned to the relative reference station as an achievable value for the Lost River watershed. Then station scores are compared to the relative reference station and assigned biological condition categories based on percent comparison. The biological condition scoring criteria for each benthic macroinvertebrates parameter assigns numeric values based on specific percentage of comparability with the reference. Qualitative results are converted into quantifiable numeric values of 6 for nonimpaired, 4 for slightly impaired, 2 for moderately impaired, and 0 for severely impaired.

The total metric score is then compared to the reference station to provide impairment category results based on >83% of the reference station for nonimpaired, 51-82% for slightly impaired, 18-50% for moderately impaired, and <17% comparability with the reference station for severely impaired. These results are shown in Table 5.

TABLE 5 – BENTHIC MACROINVERTEBRATE BIOLOGICAL CONDITION SCORING, SEPTEMBER 2004

2001										
Parameter	Relative	Station 1	Station 2	Station 3	Station 4					
	Reference									
Total Number of Taxa	6	6	6	6	6					
Total Number of EPT	6	4	2	6	2					
Taxa										
Percent Contribution	6	4	6	4	4					
of Dominant Taxa	U	4	U	4	4					
Ratio of			0	0						
EPT/Chironomidae	6	6	0	0	6					
Modified Biotic Index	6	6	6	6	6					
Ratio of		0	-	2	4					
Scraper/Filterer	6	0	6	2	4					
Ratio of		0	0	0						
Shredder/Nonshredder	6	0	0	0	6					
Total Score	42	26	26	24	34					
Percent of Reference	100	62	62	57	81					
Impairment Category	None	Slight	Slight	Slight	Slight					

5.2 Physical Evaluation Results

The purpose for evaluating the physical habitat features of the selected locations within the Lost River watershed is to quantify the condition and quality of the instream and riparian habitat. The use of the Ohio EPA Qualitative Habitat Evaluation Index (QHEI) was used and is included in Appendix I. The summary of the QHEI habitat scoring technique from the 2004 surveys are provided in Table 6.

TABLE 6 - OHEI RESULTS FOR LOST RIVER, SEPTEMBER 8, 2004

	Relative Reference	Station 1	Station 2	Station 3	Station 4
Habitat Parameters					
Substrate	18	<mark>18*</mark>	14	17	12
Instream Cover	17	<mark>17*</mark>	16	16	15
Channel Morphology	11	<mark>11*</mark>	<mark>11*</mark>	<mark>11*</mark>	11*
Riparian Zone and Bank Erosion	4.5	4.5*	4.5*	4	4.5*
Pool/Current Quality	10	8	8	<mark>10*</mark>	8
Riffle/Run Quality	5	<mark>5*</mark>	3	4	4
Gradient	6	<mark>6*</mark>	<mark>6*</mark>	<mark>6*</mark>	<mark>6*</mark>
Total Score	71.5	69.5	62.5	68	60.5
Percent of Reference	100	97	87	95	85

^{*} indicates highest quality, used as reference station.

5.3 Chemical Evaluation Results

V3 performed the sampling events on June 29 and 30, 2004 and January 5 and 6, 2005. The parameters included oxidation-reduction potential, temperature, conductivity, pH, dissolved oxygen, flow, and turbidity. Water quality data sheets for parameters taken in the field are included in Appendix I. V3 also collected water samples for water chemistry analysis in a laboratory for the following parameters: Ammonia, Nitrate, Nitrite, Total Kjeldahl (baseflow only), Dissolved Phosphorous, Total Phosphorous and *Escherichia coliform*. Results for the lab are included in Appendix IV. Table 7 shows the results of the baseflow data and Table 8 shows the results of the stormflow data.

TABLE 7 – SUMMARY OF BASEFLOW SAMPLING WATER QUALITY DATA FOR LOST RIVER, JUNE 29 AND 30, 2004

Parameter	Units	St. 1	St. 2	St. 3	St. 4	St. 6	St. 7	St. 9	St. 10
Nitrogen, Ammonia	mg/L	0.850	0.567	0.624	0.678	1.02	0.524	0.500	0.488
Nitrogen, Nitrate	mg/L	11.9	7.83	10.0	9.71	0.864	7.03	6.28	6.60
Nitrogen, Nitrite	mg/L	0.044	0.022	0.033	0.036	< 0.010	0.013	0.014	0.017
Nitrogen, Total Kjeldahl	mg/L	1.68	0.980	0.840	1.12	1.40	0.980	0.700	0.840
Phosphorus, Dissolved	mg/L	0.033	0.038	0.028	0.020	0.054	0.062	0.064	0.062
Phosphorus, Total	mg/L	0.039	0.041	0.032	0.027	0.064	0.074	0.087	0.077
Escherichia Coliform	cfu/ 100ml	6,300	440	310	90	No	60	710	1,030
						sample			
рН	-log [H+]	7.82	8.08	7.96	7.70	7.30	7.36	7.47	7.58
Conductivity	umhos/cm	389	437	433	422	432	429	439	465
Air Temperature	°C	28.0	28.0	29.0	28.0	22.0	22.0	31.0	20.0
Water Temperature	°C	20.8	21.0	21.6	21.0	17.0	17.0	17.0	15.6
Dissolved Oxygen	mg/L	11.38	8.64	10.65	10.98	6.55	5.95	7.52	8.05
Dissolved Oxygen	% saturation	128%	96%	123%	122%	68%	61%	78%	82%
Turbidity	NTU	3.7	1.7	2.9	2.1	8.0	7.8	29.0	12.0
Flow Volume	Ft ³ /second	5.0	3.4	15.0	30.0	27.1	no reading	no reading	no reading
Date of Sampling	MM/DD	06/29	06/29	06/29	06/29	06/30	06/29	06/29	06/29
Time of Sampling	Military	08:30	08:40	08:50	09:10	10:30	10:00	10:20	11:10

TABLE 8 – SUMMARY OF STORMFLOW WATER QUALITY DATA FOR LOST RIVER, JANUARY 5 AND 6, 2005

Parameters	Units	St. 1	St. 2	St. 3	St. 4	St. 5	St. 7	St. 8	St. 9	St. 10
Nitrogen, Ammonia	mg/L	0.074	0.074	0.077	0.118	0.234	0.177	0.201	0.057	0.051
Nitrogen, Nitrate	mg/L	2.04	2.05	2.10	1.77	2.88	4.41	2.05	3.03	3.36
Nitrogen, Nitrite	mg/L	0.013	0.011	0.012	0.014	0.015	0.014	0.015	0.011	0.011
Phosphorus, Dissolved	mg/L	0.206	0.202	0.253	0.256	0.281	0.171	0.311	0.093	0.098
Phosphorus, Total	mg/L	0.270	0.263	0.326	0.364	0.467	0.289	0.537	0.165	0.177
Escherichia Coliform	cfu/ 100ml	690	1,600	2,400	2,700	4,800	2,000	5,000	2,800	940
pН	-log [H+]	6.92	6.83	6.90	7.14	6.92	6.82	7.14	6.73	6.75
Conductivity	umhos/cm	90.1	109.4	92.4	85.2	156.5	214.3	112.8	210.6	223.5
Air Temperature	°C	3.3	2.2	2.2	1.7	4.4	4.4	5.6	5	5.6
Water Temperature	°C	6.7	7.1	6.8	6.7	10.3	10.8	9.7	11.4	11.6
Dissolved Oxygen	mg/L	12.9	13.1	13.1	12.8	11.8	10.9	11.3	11.6	10.1
Dissolved Oxygen	% saturation	106	107	107	105	104	98	100	105	94
Turbidity	NTU	27	22	35	45	80	45	85	36	33
ORP	Ft ³ /second	208	208	194	185	213	259	174	224	230
Date of Readings	MM/DD	01/06	01/06	01/06	01/06	01/05	01/05	01/05	01/05	01/05
Time of Readings	Military	08:45	08:15	07:45	07:15	07:30	08:30	11:00	09:30	11:30

5.4 Field Review

V3 provided Orange County SWCD, LARE staff, as well as the representatives of interested volunteer water quality monitoring groups with advanced notification of the sampling dates. Representatives of these organizations were able to attend the sampling events and observe and learn the field data collection techniques. The biological sampling efforts were performed with Frank Hodges (IDNR) and Treva Brim (Orange County SWCD) in attendance. Additionally, Frank Hodges of the IDNR was in attendance during the baseflow and stormflow sampling efforts.

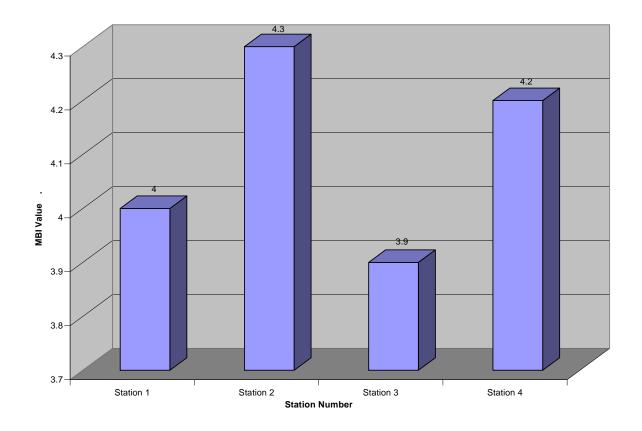
6.0 DISCUSSION

The macroinvertebrate community results demonstrate a very healthy richness measure at all four stations through the values of Total Number of Taxa. However, Stations 2 and 4 provide only 75% of the reference station's potential for EPT Taxa, and are considered Moderately Impaired by this metric. Total Number of EPT Taxa stands for the collective orders of Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies). These three orders of insects are considered indicative of healthy macroinvertebrate communities and high water quality. Composition measures such as Percent Contribution of Dominant Taxa will decrease as water quality, habitat diversity and habitat suitability improve. measures such as Ratio of EPT to Chironomidae (midges) reflects good biotic condition if the sensitive groups (EPT) demonstrate a substantial representation. However, if the Chironomidae have a disproportionately large number of individuals in comparison to the sensitive groups then this situation is indicative of environmental stress. Both Stations 2 and 3 resulted in a severely impaired biological condition for this metric, because the relative reference station has a high value due to the high value at Stations 1 and 4. Otherwise these values are typically representative of healthy biological communities on a regional scale.

Tolerance/Intolerance measures are intended to be representative of relative sensitivity to perturbation. The Hilsenhoff Biotic Index developed in 1982 is oriented towards the detection of organic pollution but is generally not specific to the type of stressor. The Modified Biotic Index (MBI) was also developed to detect organic pollution and is based on the original species level index developed by Hilsenhoff. Pollution tolerance values range from 0 to 10 and increase as water quality decreases. The lower the MBI, the greater the number of pollution intolerant species (see Exhibit V).

All four of the stations demonstrate a very health tolerance/intolerance measure. The evaluation of Functional Feeding Groups through the ratio of scraper to filtering collector reflects the riffle/run community food base. Filtering collectors are sensitive to toxicants bound to fine particles and should be the first group to decrease when exposed to steady sources of such toxicants. Station 1 demonstrated severely impaired biological condition and Station 3 demonstrates moderately impaired values for this metric. The ratio of shredders to nonshredders through the CPOM evaluation demonstrates the riparian zone impacts from the toxicants that are readily adsorbed into the plant parts within the CPOM. Stations 1, 2 and 3 all showed severe impairment through this evaluation metric.

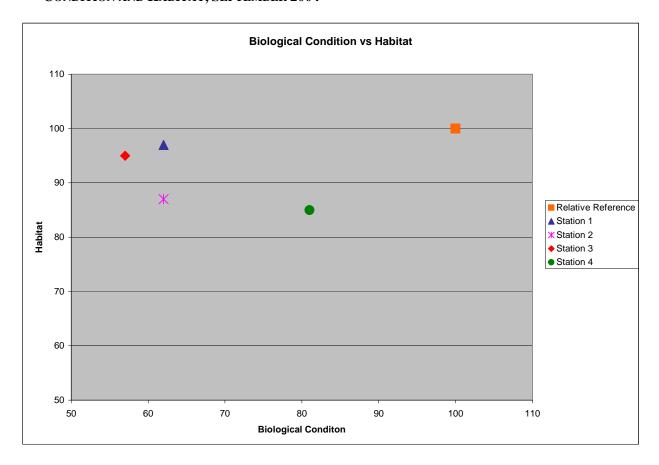
EXHIBIT V - MODIFIED BIOTIC INDEX (MBI) FROM BIOLOGICAL CONDITION, SEPTEMBER 2004



Habitat incorporates all aspects of physical and chemical constituents along with the biotic interactions. Habitat includes all of the instream and riparian habitat that influences the structure and function of the aquatic community in a stream. The presence of an altered habitat structure is considered one of the major stressors of aquatic systems. The presence of degraded habitat can sometimes obscure investigations on the effects of toxicity and/or pollution. The Ohio EPA QHEI total score values are classified within four quality categories: Excellent = 76 to 100, Good = 51 to 75, Fair = 26 to 50, Poor = 0 to 25. All four of the sampling stations evaluated for habitat during the Lost River Watershed Final Water Quality Monitoring Study resulted in Good habitat ratings.

Exhibit VI graphically displays comparisons of each of the four stations to the relative reference station. The reference station is normalized at 100% of the habitat scoring and 100% of the biological condition. This represents the achievable potential of each sampling station. The biological data source for this graph can be found on Table 5, the habitat data source can be found on Table 6.

EXHIBIT VI – PERCENTAGE OF REPRESENTATIVE REFERENCE STATION FOR BIOLOGICAL CONDITION AND HABITAT, SEPTEMBER 2004



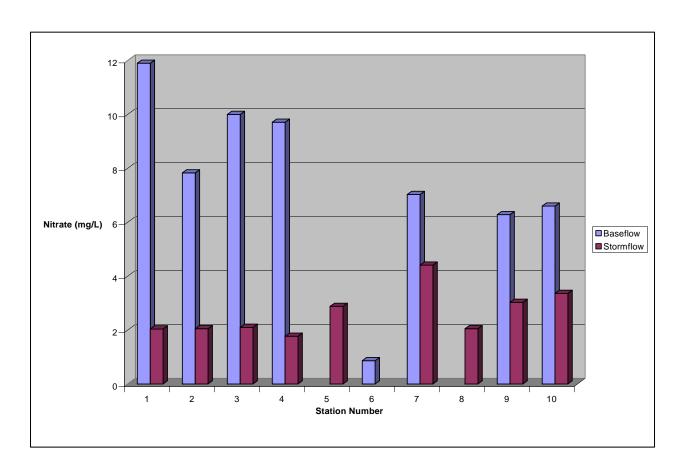
The relative reference stream represents regional expectations with 100 for both habitat and biological condition. Station 1 and 3 are both comparable to the reference for habitat and are both slightly impaired for biological condition. Stations 2 and 4 are both supporting for habitat and slightly impaired for biological condition. The relationship between habitat quality and biological condition demonstrates that good quality habitat will support high quality biological communities, and responses to minor alterations in habitat will be subtle and of little consequence. Discernible biological impairment results as habitat quality continues to decline.

In areas of good or excellent habitat, biological communities will reflect degraded conditions when water quality effects are present. This graph demonstrates a condition where organic pollution or toxicants will adversely affect biological condition regardless of the quality of the habitat.

Phosphorus levels are high at 1,2,3,4,5,7,8,9 and 10 during stormflow sampling in January 2005 and at 1,2,3,6,7,9 and 10 during baseflow sampling in June 2004. The only station sampled that was not over the 0.03 mg/L level which can cause algal blooms was Station 4 during baseflow and the value (0.027 mg/L) was just barely below that level (Vollenweider 1968, Wetzel 1975).

Nitrate (NO₃) generally occurs in trace quantities in surface water but may attain high levels in some groundwater. In excessive amount, it contributes to the illness known as methemoglobinemia in infants. A limit of 10 mg/L has been imposed on drinking water to prevent this disorder. Stations 1 and 3 during the June 2004 sampling effort had reached these high levels, shown in Exhibit VII.

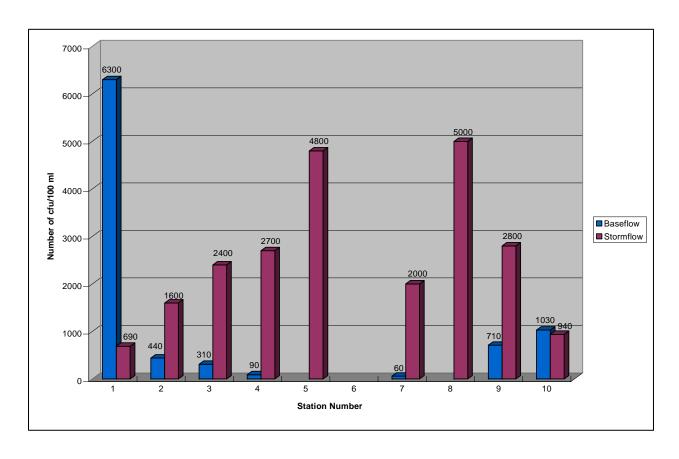
EXHIBIT VII – AMOUNT OF NIRATE IN MG/L FROM BOTH BASEFLOW AND STORMFLOW SAMPLING EFFORTS, JUNE 2004 AND JANUARY 2005.



Escherichia coli, know as *E coli*, is a member of the fecal coliform group of bacteria. When this organism is detected within water samples, it is an indication of fecal contamination. *E coli* is an indigenous fecal flora of warm-blooded animals. Contributions of detectable *E coli* colonies may appear within water samples due to the input from human or animal waste. The state standard in Indiana for *E coli* is 235 cfu/100mL. The measure of cfu per 100 mL means the

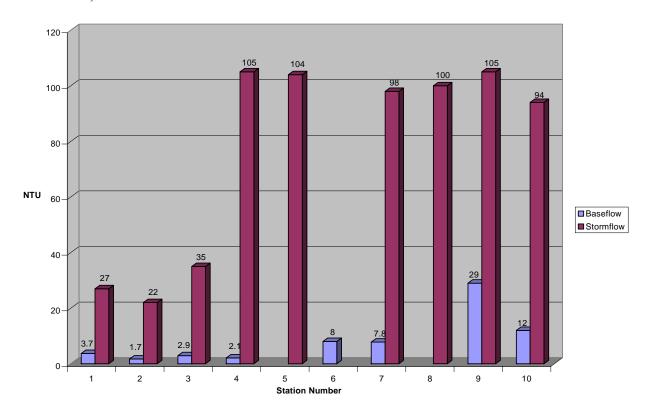
count of colony forming units that exist in 100 milliliters of water. All stations analyzed during the stormflow sampling of January 2005 tested much higher than level, including Stations: 1,2,3,4,5,7,8,9 and 10. Five of the seven stations analyzed during the baseflow sampling effort of June 2004 tested higher than this level, including Stations: 1, 2, 3, 9 and 10. The only two stations that were below this level were Stations 4 and 7. *E. coli* counts are shown by station in Exhibit VIII. The most contaminated location was Station 1, the upstream most station on South Fork Lost River, where the concentration of *E coli* (6,300 cfu/100ml) was more than six times that of any other station analyzed during the baseflow sampling effort.

EXHIBIT VIII – NUMBER OF COLONY FORMING UNITS (CFU) OF *E. COLI* IN BOTH BASEFLOW AND STORMFLOW SAMPLING EFFORTS, JUNE 2004 AND JANUARY 2005.



Interestingly, the stations with the highest levels of *E coli* were both drybed sampling stations, Stations 5 (4,800 cfu/100ml) and Station 8 (5,000 cfu/100ml). These two stations also shared the highest turbidity levels, Station 5 (80 NTU) and Station 8 (85 NTU). Turbidity values by station are shown in Exhibit IX. Perhaps this was due to the higher concentrations of bacteria and fine particles building up in these typically dry riverbeds and the stormevent carrying a plume through these reaches that otherwise would not be at these heightened levels under perennial flow conditions.

EXHIBIT IX – TURBIDITY VALUES IN NTU'S FOR BOTH BASEFLOW AND STORMFLOW SAMPLING EFFORTS, JUNE 2004 AND JANUARY 2005.



Indiana Department of Environmental Management (IDEM) has performed sampling of macroinvertebrates, habitat and water quality at four sites (Carters Creek was sampled twice at the same location) within the Lost River Watershed from 1993 to 2002 (see Table 9). Of the four stations, two of these are identical to locations sampled during V3's study. Direct correlation with IDEM data is limited as different collection methods were used in each study for macroinvertebrates. Kick samples and Hester/Dendy samples were collected for the IDEM sites while multi habitat kick net samples were taken in the V3 study. Alternative seasons were used for several of the IDEM samples, so it would be difficult to compare as the biological community changes depending on the time of year. Also as many as 352 individual macroinvertebrates were identified in the IDEM sample, while the protocol that V3 followed limited the samples to 100 individuals. This discrepancy could affect value interpretation to a significant degree. However, it is important to note from the IDEM data that the Lost River's macroinvertebrate results demonstrate healthy communities. While the QHEI data is more directly comparable there were different categories and different scales for the categories that were used from 1993 to 2004. In the IDEM data, habitat also demonstrated high quality conditions. The water quality parameters were limited to Water Temperature, Dissolved Oxygen, pH and Specific Conductance (see Table 10). No interpretive conclusion can be drawn from comparing IDEM's data to V3's data. It should be noted that all of the water quality parameters, although representing a unique karst river system, are within regionally acceptable levels as compared to values throughout the state (DJ Case 2005).

TABLE 9 – BENTHIC MACROINVERTEBRATE AND HABITAT RESULTS FROM IDEM

Stream Name	Station ID	Location	Sample	QHEI	HBI
			Date		
Lost River	WEL150-0007	425 N	8/6/02	70	4.45
Lost River	WEL150-0005	Tater Rd.	10/28/93	87	4.3
Carters Creek	WEL150-0006	Tater Rd.	11/2/93	89	3.97
South Fork Lost River	WEL150-0004	CR 350 N	11/2/93	85	4.67
Carters Creek	WEL150-0006	Tater Rd.	8/27/97	80	4.57

TABLE 10 - WATER QUALITY RESULTS FROM IDEM

Waterway	Station ID	Location	Sample	Water	Dissolved	pН	Turbidity	-
			Date	Temp. (°C)	Oxygen (mg/L)	(-log [H+])	(NTU)	Conductance (umhos/cm)
Lost River	WEL150-0005	Tater Rd.	10/28/93	10.4	10.51	7.96	-	580
Carters Creek	WEL150-0006	Tater Rd.	11/2/93	6.46	10.23	7.96	-	587
South Fork Lost River	WEL150-0004	CR 350 N	11/2/93	5.98	11.53	8.27	-	539
Carters Creek	WEL150-0006	Tater Rd.	8/27/97	22.25	7.93	8.47	-	483
Lost River	WEL150-0001	Tater Rd.	7/10/97	24.26	7.65	7.98	94.09	112
Lost River	WEL150-0001	Tater Rd.	6/11/97	16.68	9.26	7.69	11.3	401
Lost River	WEL150-0001	Tater Rd.	4/30/97	13.1	9.75	7.92	6.09	403
Lost River	WEL150-0001	Tater Rd.	3/18/97	8.96	10.37	7.76	257	331
Lost River	WEL150-0001	Tater Rd.	9/22/97	19.38	10.44	8.07	4.8	464
Lost River	WEL150-0001	Tater Rd.	12/2/97	6.9	11.44	8.03	37.4	471
South Fork Lost River	WEL150-0008	Vernon School Rd.	9/9/97	19.56	6.44	7.82	23.39	420
Lost River	WEL150-0007	425 N.	7/30/02	23.27	4.35	7.01	7.8	472
Lost River	WEL150-0007	425 N.	9/18/02	20.05	7.65	7.69	5.69	468
Lost River	WEL150-0007	425 N	8/6/02	24.75	8.65	7.53	13	461
Lost River	WEL150-0007	425 N.	6/26/02	23.79	10.62	8.68	8.5	449
Lost River	WEL150-0003	E of 337	8/14/02	24.26	7.7	7.98	8.35	412
Lost River	WEL150-0003	E of 337	7/30/02	28.29	8.06	7.98	4.36	448
Lost River	WEL150-0003	E of 337	8/6/02	28.43	8.33	8.07	5.48	441
Lost River	WEL150-0003	E of 337	8/20/02	25.85	8.97	8.05	6.94	426
Lost River	WEL150-0003	E of 337	8/27/02	25.67	9.45	8.06	6.17	405

From 1996 to 2002 IDEM collected four (three are in the study area) fish tissue samples to evaluate for contaminants on the Lost River (see Appendix V). The study summary results have been included in this report as an Appendix, but no analytical interpretation is provided. The data is up to ten years old and watershed conditions may have changed. There was also two fish surveys that were completed. One was on the South Fork Lost River (1997) and the other was on the Lost River (2002). This data is included in Appendix V. Additionally, limited water chemistry data from inorganic, organic and metal analysis was performed for 6 samples from 2002, for the following parameters: Alkalinity, CBOD5, Chloride, COD, Coliforms, Cyanide, *E. coli*, Hardness, Nitrate+Nitrite, Total Phosphorous, Sulfate, TDS, TKN, TOC, TS, TSS, Aluminum, Arsenic, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium and Zinc.

7.0 SUMMARY AND RECOMMENDATIONS

V3 Companies, Ltd (V3) has conducted the Lost River Watershed Final Water Quality Monitoring Study for the Orange County Soil and Water Conservation District (SWCD). Exhibit I shows the Project Vicinity. There are ten sampling stations for evaluating the biological, physical and chemical condition of the watershed including: macroinvertebrate communities, instream and riparian habitat and water quality parameters. The watershed of the Lost River is within the karst regions surrounding Paoli, Indiana. The Lost River watershed evaluated during this study is 106,980 acres. The portion of the river evaluated during this study has a linear river length of approximately 15.3 miles for perennial surface water in the upstream reaches, approximately 21.3 miles of linear length for intermittent drybeds, an estimated 7.5 miles of linear length for underground river systems, and another perennial surface water stream segment of approximately 25.8 miles for linear length in the downstream reaches.

Prior to the implementation of the best management practices, there was no baseline study performed to establish the conditions of water quality, macroinvertebrate communities and habitat. The study performed by V3 in 2004 and 2005 will provide information on existing conditions for future comparisons, however, it does not allow for any current interpretation on the watersheds benefits from the implementation of these conservation practices.

The evaluation of macroinvertebrate communities within the watershed describe the biological health at a level which provides insight into point and nonpoint source impacts which otherwise may or maynot be able to be measured. The four upstream most stations were the only stations evaluated for macroinvertebrates, as the other stations were nonsuitable for the collection effort due to dryness, depth or lack of habitat. All four of the stations posses a slightly impaired biological condition.

Habitat incorporates all aspects of physical and chemical constituents along with the biotic interactions. Habitat includes all of the instream and riparian habitat that influences the structure and function of the aquatic community in a stream. The presence of an altered habitat structure is considered one of the major stressors of aquatic systems. The presence of degraded habitat can sometimes obscure investigations on the effects of toxicity and/or pollution. All four of the sampling stations evaluated for habitat during the Lost River Watershed Final Water Quality Monitoring Study resulted in Good habitat ratings.

Water quality analysis of the watershed during baseflow and stormflow events showed acceptable values with the following exceptions. Phosphorus levels were high at 1,2,3,4,5,7,8,9 and 10 during stormflow sampling in January 2005 and at 1,2,3,6,7,9 and 10 during baseflow sampling in June 2004. The only station sampled that was not over the 0.03 mg/L level which can cause algal blooms was Station 4. This may be a result of the extensive winter cover locations implemented through the land use conservation best management practices program. Please see Exhibit III for the significant portions of the land surrounding Lost River upstream of Station 4 which participated in this program. It is likely that the cover crop provided the necessary filtration and buffer to prevent the higher levels of phosphorus within the mainstem of the Lost River.

Nitrate was measured at high levels at both Stations 1 and 3 during the June 2004 sampling effort. Since Station 3 is immediately downstream of Station 1, it is assumed that the nitrate source is coming from the South Fork of Lost River and not from the headwaters of Carter Creek. It is recommended that more focus be placed on implementing additional land use conservation best management practices along the Orange County and Washington County agricultural lands surrounding the South Fork of Lost River.

The stations with the highest levels of *E coli* were baseflow conditions at Station 1 (6,300 cfu/100ml) along the South Fork Lost River and stormflow condition at both drybed sampling stations along Lost River, Stations 5 (4,800 cfu/100ml) and Station 8 (5,000 cfu/100ml). Stations 5 and 8 also shared the highest turbidity levels, Station 5 (80 NTU) and Station 8 (85 NTU). Perhaps this was due to the higher concentrations of bacteria and fine particles building up in these typically dry riverbeds and the stormevent carrying a plum through these reaches that otherwise would not be at these heightened levels under perennial flow conditions.

In areas of good or excellent habitat, biological communities will reflect degraded conditions when water quality effects are present. This graph demonstrates a condition where organic pollution or toxicants will adversely affect biological condition regardless of the quality of the habitat.

Land use best management conservation practices were implemented by the Orange County SWCD's to improve the Lost River watershed from 2001 through 2005. The land use best management conservation practices included: winter cover crop, heavy use area feeding pads, spring development, and pasture/hayland plantings. The best management land use conservation practices implemented by the Orange County SWCD to improve the Lost River watershed were all located within rural agricultural areas.

This report recommends that further implementation of land use best management practices continue to be implemented to prevent degradation to macroinvertebrate communities, habitat and water quality within this unique river system. Specific water quality improvements in bacteria, nitrogen as nitrates, and turbidity are warranted. This report recommends taking further measures to install additional winter cover crops, heavy use area feeding pads and pasture/hayland plantings. Along with the addition of no-till conservation tillage, stormwater runoff diversions, cool season grass filter strips, pipe structure grade stabilization structures, rock rip-rap grade stabilization structures, grass waterways, tree plantings, waste management containment systems, and water and sediment control basins.

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APPENDIX I:

V3 COMPANIES FIELD DATA SHEETS

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Chimora -	orange larvae	D HAY	6	I	IJει.	1	ļ.	-				
	1											
			i						-	_		
Hemiplers 3440	+ - His 144 .	4.									 	
Vellidae	Ltt til	(2)	\$	A	10 6L							
Gerridae	144	7	8	Α	mer mer			- -	-			
		() 1-3:1	most	certain	, 5=lee	st certs	in. If rating is 3-	5, give reason (e.g., mi	sing g	ills). I	S= life	stage

Table Company 100

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

South Fat Lost River STREAM NAME LOCATION STATION# RIVERMILE STREAM CLASS LAT LONG RIVER BASIN STORET# AGENCY INVESTIGATORS ESB LOT NUMBER FORM COMPLETED BY DATE REASON FOR SURVEY TIME 10:00 AM) PM £ 513

HABITAT TYPES	Indicate the percentage of each habitat type present Cobble 10 % Snags 8 % Q Vegetated Banks 2 % Submerged Macrophytes 3 % Other (Ø Sand <u>*</u> %
SAMPLE COLLECTION	Gear used 💆 D-frame 🗅 kick-net 🗆 Other How were the samples collected? 💆 wading 🔘 from bank	Q from boat
	Indicate the number of jabs/kicks taken in each habitat type. Cobble 3 Snags 3 Vegetated Banks 3 Submerged Macrophytes 3 Other (Ø Sand 3)
GENERAL COMMENTS		

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	. 0 1 (2) 3 4	Slimes	① 1 2 <u>3</u> 4
Filamentous Algae	0 1 2 3 4	Macroinvertebrates	0 1 2 3 4
Macrophytes	0 1 (2) 3 4	Fish	0 1(2) 3 4
		Ro. Khacil	

FIELD OBSERVATIONS OF MACROBENTHOS

Banded Scalpin-11

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	I	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	I	2	3	4
Turbellaria	. 0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4				•		
Isopoda	0	1	. 2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4	•			•		
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4	•					
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

	· · ·								
STREAM NAME South	Fork Lost Riva	LOCATION (TE 358	S N					
	IVERMILE	STREAM CLASS							
	ONG	RIVER BASIN							
STORET#		AGENCY							
INVESTIGATORS &	JB, W6L								
FORM COMPLETED BY	66	DATE <u>9/9/04/</u> TIME <u>(0:00</u>	AMO PM	REASON FOR SURVEY					
WEATHER CONDITIONS	rain () Showers **Space** %cl	(heavy rain) steady rain) steady rain) oud cover ear/sunny	kours O O	Has there been a heavy rain in th O Yes O No Air Temperature C Other	e last 7 days?				
SITE LOCATION/MAP		 -	-	pled (or attach a photograph)	 				
			. •						
					٠.				
				• .					
	V*		·		•				
	,	· · · · · · · · · · · · · · · · · · ·	4 -	· · · · · · · · · · · · · · · · · · ·					
STREAM CHARACTERIZATION	Stream Subsystem Perennial Inter	rmittent 🗅 Tidal	1 .	Stream Type Coldwater					
	Stream Origin Glacial Non-glacial montane Swamp and bog	O Spring-fed Mixture of O Other		Catchment Areakm²	<u>-</u>				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET 9/9/04 (BACK)

WATERSHED FEATURES	Predominant Surrounding Landuse Forest	Local Watershed NPS Pollution No evidence Some potential sources Obvious sources Local Watershed Erosion None Moderate Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the domin Indicate the dominant species present	nant species present Grasses D Herbaceous
INSTREAM FEATURES	Estimated Reach Length 90 m Estimated Stream Width 9 m Sampling Reach Area m² Area in km² (m²x1000) km² Estimated Stream Depth 35 m Surface Velocity m/sec (at thalweg)	Canopy Cover Partly open Partly shaded Shaded High Water Mark 6 m Proportion of Reach Represented by Stream Morphology Types Prool 50 % PRun 50 % Channelized Pres No recovery Dam Present Pres Proo
LARGE WOODY DEBRIS	LWD 3 m² Density of LWDm²/km² (LWD/ reac	th area)
AQUATIC VEGETATION	Indicate the dominant type and record the dominant Rooted emergent	☐ Rooted floating ☐ Free floating
WATER QUALITY	Temperature 65.0° g F Specific Conductance 410,9 mhos Dissolved Oxygen 9.32 ms/L pH 7.45 Turbidity 3.3 WQ Instrument Used Troll 9000 ORP = 3.50	Water Odors Normal/None
SEDIMENT/ SUBSTRATE	Oders Normal Sewage Petroleum Chemical Anaerobic None Other Oils Absent Slight Moderate Profuse	Deposits Sludge Sawdust Paper fiber Sand CRelict shells Other Looking at stones which are not deeply embedded, are the undersides black in color? Yes No

INC	RGANIC SUBSTRATE (should add up to 1		ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)						
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area				
Bedrock	ock		Detritus	sticks, wood, coarse plant					
Boulder	> 256 mm (10*)		1	materials (CPOM)					
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic	- "				
Gravel	2-64 mm (0.1"-2.5")] .	(FPOM)					
Sand	0.06-2mm (gritty)		Mari	grey, shell fragments					
Silt	0.004-0.06 mm		7						
Clay	< 0.004 mm (slick)		1	1					

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Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 69.5

River Code: 5k 4 RM: Stream: South Fork L	of Rier
Date: 4/9/04 Location: 5te	
Scorers Full Name: Ed Burnote Affiliation: V3	
1] SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % pres	
TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE O	
GRAVEL [7]Check ONE (OR 2 8	
DE-BOULDER [9] DE-SAND [6] DE-LIMESTONE	- T
DICOBBLE [8] DIBBEDROCK[5] DITILLS [1]	minimum fail
OELHARDPAN (4) OEDETRITUS(3) D -WETLANDS(
HARDPAN [0]	
L-1	[0] EMBEDDED -EXTENSIVE [-2] Max 20
	NESS: Z -MODERATE [-1]
NUMBER OF SUBSTRATE TYPES: #4 or More [2] -LACUSTRINE	* * · · · · · · · · · · · · · · · · · ·
(High Quality Only, Score 5 or >)	II-NONE [1]
COMMENTS	• •
2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for in	Cover
(Structure) TYPE: Score All That Occur	check 2 and AVERAGE)
	CKWATERS [1]
OVERHANGING VEGETATION [1] ROOTWADS [1] AQUATIC MAC	
SHALLOWS (IN SLOW WATER) [1]BOULDERS [1]LOGS OR WO	
ROOTHATS [1] COMMENTS:	D - NEARLY ABSENT < 5%[1]
3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2	
SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY	MODIFICATIONS/OTHER Channel
HIGH [4] G-EXCELLENT [7] G-NONE [6] G-HIGH [3]	☐ - SNAGGING ☐ - IMPOUND.
	[2] - RELOCATION - ISLANDS
ELOW [2] AIR [3] A-RECOVERING [3] ELOW [1]	☐ - CANOPY REMOVAL ☐ - LEVEED Max 20
- NONE [1] - POOR [1] - RECENT OR NO	☐ - DREDGING ☐ - BANK SHAPING
RECOVERY [1]	ONE SIDE CHANNEL MODIFICATIONS
COMMENTS:	
4]. RIPARIAN ZONE AND BANK EROSION check ONE box per bank or check 2 ar	
RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100)	- Ribariar
i, R (Per Bank) L R (Most Predominant Per Bank) L R	L R (Per Bank)
	RVATION TILLAGE [1] ET-NONE/LITTLE [3]
	OR INDUSTRIAL [0] P P -MODERATE [2]
NARROW 5-10 m [2] DE CERESIDENTIAL, PARK, NEW FIELD [1] DO-OPEN	
	3/CONSTRUCTION [0]
NONE [0]	
CÓMMENTS:	·
5.JPOOL/GLIDE AND RIFFLE/RUN QUALITY	Pool/
	RRENT VELOCITY [POOLS & RIFFLES!] Current
(Check 1 ONLY!) (Check 1 or 2 & AVERAGE)	(Check All That Apply)
☐- >1m [6] ☐-POOL WIDTH > RIFFLE WIDTH [2] ☐-EDDIES	
■ 0.7-1m [4] □-POOL WIDTH = RIFFLE WIDTH [1] □-FAST[1	· May 17
	RATE [1] D-INTERMITTENT[-2]
D • 0.2 - 0.4m [1]	[1]
- < 0.2m [POOL=0] COMMENTS:	······································
	Riffle/Ru
CHECK ONE OR CHECK 2 AN	<u>D AVERAGE</u>
RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTR	
☐ Best Areas >10 cm [2] ☐ MAX > 50 [2] ☐ STABLE (e.g., Cobble,	
2 Best Areas 5-10 cm[1] 2 MAX < 50[1] □-MOD. STABLE (e.g., La	arge Gravel) [1] 🔟 - LOW [1] Max 8
☐ - Best Areas < 5 cm ☐-UNSTABLE (Fine Grav	rel,Sand) [0]
☐ - Best Areas < 5 cm ☐ UNSTABLE (Fine Grav	
☐ - Best Areas < 5 cm ☐ UNSTABLE (Fine Grav {RFFLE=0}	rel,Sand) [0]
☐ - Best Areas < 5 cm ☐-UNSTABLE (Fine Grav [RIFFLE=0] COMMENTS:	rel,Sand) [0]
☐ - Best Areas < 5 cm ☐-UNSTABLE (Fine Grav [RIFFLE=0] COMMENTS:	rel,Sand) [0]
☐ - Best Areas < 5 cm	rel,Sand) [0]

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		macroberra	ios Quantauve Samp	o Lioi				
	ORDER	FAMILY	GENUS	SPECIES	COUNT	TOLERANCE VALUES		
	Nematomorpha						0.000	Parasite
	Hydracarina- Trombidiformes						0.000	Predators/Parasite
13	Tubellaria	Planaria			1	4	0.047	Omnivore
	Porifera	Spongilidae		1-1-			0.000	Filters
25	Pelecypoda	Unionidae	Villosa	iris	-	2.2	0.000	
20		Corbiculidae	Corbicula	fluminea	-	3.2	0.000	
		Sphaeriidae Dreissenidae	Dreissena	nolymomha		8	0.000	Filters
	Gastropoda	Ancylidae	Dreisseria	polymorpha		6	0.000	Scrapers
	Gastopoda	Lymnaeidae				6.9	0.000	Scrapers
		Lymnaeidae	Fossaria			2.6	0.000	Scrapers
6		Physidae			1	8	0.094	Scrapers
		Physidae	Physelia			8	0.000	Scrapers
29		Planorbidae				7	0.000	Scrapers
		Planorbidae	Planorbula			7	0.000	Scrapers
7		Pleuroceridae			13		0.000	Scrapers
		Bithynlidae	Bithynia	tentaculata			0.000	Scrapers
-	Annelida	Oligochaeta		7			0.000	Gathers
31	B4-	Hirudinea				10	0.000	Gathers
3	Decapoda				1	8	0.094	Predators
20	Amphipoda	Asellidae			-	8	0.000	Shredders Shredders
02	Ostracoda	Aseiruse				8	0.000	Scavengers
	Ephemeroptera	Caenidae				7	0.000	Gathers
		Caenidae	Caenis			3.1	0.000	Gathers
		Ephemeridae	Hexagenia			3.6		Gathers
11		Baetidae			25	4	1.176	Gathers
		Baetidae	Baetis			3.1	0.000	Gathers
		Baetidae	Baetis	brunneicolor		4	0.000	Gathers
		Baetidae	Baetis	intercalaris		2.7	0.000	Gathers
		Baetidae	Calibaetis			5.6		Gathers
21		Heptageniidae	Stenacron	all decole	-	3.1	0.000	Scrapers
9		Heptageniidae	Stenacron	gildersleevei	16	3.1	0.000	Scrapers Scrapers
9		Heptageniidae	Stenonema	evicuum	10		0.753	Screners
		Heptageniidae Siphlonuridae	Stenonema	exiguum	-	1.9	0.000	Scrapers Gathers
		Ephemerellidae	Timpanoga			1	0.000	Gathers
		Leptophlebiidae	rimpanoga		-	2		Gathers
		Leptohyphidae	Tricorythodes			2.7	0.000	Gathers
10		Isonychiidae	Isonychia		1	2	0.024	Filters
	Coleoptera	Dytiscidae				5	0.000	Predators
		Gyrinidae				5		Predators
		Gyrinidae	Dineutus			3.7	0.000	Predators
22		Haliplidae				7		Predators
		Dryopidae				5	0.000	Predators
3,24		Elmidae				4	0.000	Gathers
12		Psephenidae	Psephenus		4	4	0.188	Scrapers
		Hydrophiloidae	Torolotomore		-		0.000	Gathers Gathers
14	Megaloptera	Hydrophiloidae Corydalidae	Tropisternus Corydalus		1	4	0,000	Predators
15	M egaropiera	Corydalidae	Nigronia		-	4	0.000	Predators
	100000000000000000000000000000000000000	Sialidae	rengeorina			4	0.000	Predators
	Trichoptera	Brachycentridae	Brachycentrus			1	0.000	Filters
17		Helicopsychidae	Helicopsyche	-	1	3	0.035	Scrapers Scrapers
		Helicopsychidae	Helicopsyche	borealis		3	0.000	Scrapers
27		Hydropsychidae			11	4	0.518	Filters
		Hydropsychidae	Hydropsyche			4	0.000	Filters
		Hydropsychidae	Hydropsyche	betteni	-	4	0.000	Filters
		Hydropsychidae	Hydropsyche	scalaris	-	4	0.000	Filters
		Hydropsychidae	Symphitopsyche		-	4	0.000	Filters
		Hydroptiidae	1.6 odera tila		-	3.2	0.000	Gathers Gathers
		Hydroptilidae	Hydroptila		-	4		
		Leptoceridae Leptoceridae	Nectopsyche		-	4		Shredders Shredders
		Molannidae	rectopsyche		-	6	0.000	Gathers
26		Odontoceridae				0	0.000	- Julier e
-		Philopotamidae				3		Filters
33		Philiopotamidae	Chimarra		2	4		Filters
		Phryganeidae	Hagenella			4	0.000	Shredders
		Polycentropodidae	Cymellus			6	0.000	Filters
		Psychomylidae	Lype			2	0.000	Gathers
30	Hemiptera	Belostomatidae					0.000	Predators
		Belostomatidae	Belostoma				0.000	Predators Predators
		Corbidae		-	-	10	0.000	Predators
5		Gerridae	Trenchates	-	1	5	0.059	Predators
		Gerridae Nepidae	Trepobates		+	5	0.000	Predators Predators
		Nepidae	Ranatra				0.000	Predators
		Notonectidae	Notonecta				0.000	Predators
4		Velidae	Rhagovella		2		0.000	Predators
	Plecoptera	Chloroperlidae				1	0,000	Predators
		Perlidae	Perlesta			1	0.000	Predators
		Perlidae	Neoperla			1	0.000	Predators
8		Perlidae	Claassenia		1	1	0.012	Predators
1	Odonata-Anisoptera	Aeshnidae			3	3	0.106	Predators
		Aeshnidae	Boyeria		-	3	0.000	Predators
		Gomphidae			-	1		Predators
-		Cordulegastridae			-	3	0.000	Predators
28		Cordulidae			-	5	0.000	Predators
	Odonata Zupontes	Libellulidae	-	-	-	9		Predators
	Odonata-Zygoptera	Calopterygidae	Caloniano		14	5 3.7	0.000	Predators
		Calopterygidae Coenagrionidae	Calopteryx		14	6.1	0.009	Predators Predators
2			Argia			5.1		Predators
15						9	0.000	Predators
		Coenagrionidae	Engallagma				0.000	Predators
			Engallagma			9	0.000	
		Coenagrionidae Coenagrionidae Lestidae	Engallagma			9 5.7		
	Diptera	Coenagrionidae Coenagrionidae Lestidae Ceratopogonidae	Engallagma			5.7	0.000	Gathers
15 35 16	Diptera	Coenagrionidae Coenagrionidae Lestidae	Engallagma		1		0.000 0.000 0.071	Gathers Gathers
15	Diptera	Coenagrionidae Coenagrionidae Lestidae Ceratopogonidae Blood-red Chironomidae Other Chironomidae Culicidae	Engallagma		1 1	5.7 8.1 6 8	0.000 0.000 0.071 0.094	Gathers Gathers Gathers Shredders
15 35 16 18	Diptera	Coenagrionidae Coenagrionidae Lestidae Ceratopogonidae Biood-red Chironomidae Other Chironomidae Culicidae Simulidae	Engallagma		1 1	5.7 8.1 6 8	0.000 0.000 0.071 0.094 0.000	Gathers Gathers Gathers Shredders Filters
15 35 16	Diptera	Coenagrionidae Coenagrionidae Lestidae Ceratopogonidae Blood-red Chironomidae Other Chironomidae Culicidae Simulidae Tipulidae	Engallagma		1 1	5.7 8.1 6 8 6 3	0.000 0.000 0.071 0.094 0.000	Gathers Gathers Gathers Shredders Filters Predators
15 35 16 18	Diptera	Coenagrionidae Coenagrionidae Lestidae Ceratopogonidae Biood-red Chironomidae Other Chironomidae Culicidae Simulidae	Engallagma		1 1	5.7 8.1 6 8	0.000 0.000 0.071 0.094 0.000 0.000	Gathers Gathers Gathers Shredders Filters

TAXA RICHNESS	19	
FBI	4.021	
Scraper/Filter	2.500	
EPT/Chironomidae	57.000	
% Contribution of Dominant Taxa	0.250	
EPT Index	7.000	
Community Similarity Indices	0.000	
	1.000	
CPOM	0.010	
Total Number Collected	100	
total shredders	1	

Comm. Loss = 0 Jaccard Coef. = 1

BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (FRONT)

page of
LOCATION Tater Rosel
STREAM CLASS
RIVER BASIN
AGENCY
LOT#
SUBSAMPLE TARGET 100 0 200 0 300 0 Other

0	rganisms	No.	LS	TI	TCR	O:	ganisms	No.	LS	TI	TCR	1
Oligochaeta						Megaleptora	Meg Mil	8	I,	464		<u> </u> -
	<u></u>			<u>.</u>		riffik		₩	J	****	M	1
Hirudinea							-UK IM MINT	23	工	U6L	,	1
				<u> </u>		- Din 39 11 -	Halipilae	72	A	wal	1	┰
Isopoda						FIFEA	HIM HI HOW	3/3	A	un	1	(S
	-1				<u> </u>	L'étable	- W - W -	X	4	44	<u> </u>	╬
Amphipoda	HI WI WI HITH	11/20	A	wit	ı		7 (/2)		4	141	1	1
-	(a)					Pyta	-#				<u> </u>	1
Decapoda	MIII (2)	8	A	U 6L	1	(consty	MI O	5	1-	uti	2]
				<u> </u>	ļ	Poples Les	л <u>О</u>	1	I	16C	1	
Ephenieroptera		(3)			. ,	Mosquite	h 0	1	5	V61	1]
(Brefie	THE THE THE THE	說	##	HT.	1	Gastropoda SA	- 11	2	*	pré -	-+	
\>	Stenaron (I	WEL	1	trapdoor	- MIN (4)	8	A	ucl	1]
-1	Stenonoma (T	8	T	464		· (24)	#	<u> </u>	<u> </u>		<u> </u>	
						Pelecypoda				<u> </u>	$oxed{oxed}$	
Piecoptera	MUTHU HUICE) _V (I	will	ı	j						
:-1							(3)				<u> </u>	╛
						Other Calypoit	rigida - MI NI	. ©	I	νu		
						pleneria -	MII (3	17	A	Ų EL	1	1
						6Jonata -	my E	8	I	անե	┷	⇃
Trichopteran	MANUAL HUML	44	141	<u> </u>		c 0er	MUIII - arg. 13	14	F	16L	<u> </u>	╛
& Chimen	MI II (3) 8	1	ull]		<u> </u>			<u> </u>	1
	\sim (3)	141	I	WCL	1			<u> </u>		ļ	<u> </u>	1
			<u> </u>		<u> </u>			$oxed{oxed}$		1	<u> </u>	4
			_	<u> </u>	ļ]		<u> </u>			igspace	1
	F	\perp	_		<u> </u>			<u> </u>	<u> </u>	<u> </u>	Ļ	1
Hemiptera Land	Higer-IN AM (3	0	A	WEL				ļ	1	<u> </u>	 	4
		1	1	1	1	[1.	1	1.		╽

Taxonomic certainty rating (TCR) 1-5:1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS=life stage: I = immature; P = pupa; A = adult TI = Taxonomists initials

lotal No. Organisms	100	Total No. Taxa	_သ	_
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BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME	(Qu	^te	<u></u>		ree	LOCATION	ON 7	2.4	۔ م	_	200~			<u> </u>	-	_	
STATION# 🔾			ERM			STREAM			•		NUC-	<u> </u>				<u>.</u>	
LAT		LON	1G _			RIVER B	ASTN										_
STORET#						AGENCY		_									
INVESTIGATORS	4	7	B.	/1	11	11021101				\neg	Y CO	NUMBER					
FORM COMPLETE		Y	5 	<u>u</u>	<u> </u>	DATE TIME	9/8/0 10.00) p1	м		ASON FOR SURVEY			<u> </u>		
HABITAT TYPES	1	india Co	cate obble bme	the p	perce % Mac	stage of each habit Snags 5 % ophytes 5 %	tat type	pres Vege	ent tate	d Ba	nks_	5 % # Sand_	0%				
SAMPLE COLLECTION	1	woE	wer	e the	: \$4.M		Wadi	ng	[G fre	om ba	ank 🖸 from bo	- >at				
	9	í Co Í Su	bble bme	ged	Mac	r of jabs/kicks tal ØSnags 3 phytes 5	Z	/ege	tated	i Ba Othe	ype. nks r (<u>S</u>	<u>z</u>				
GENERAL COMMENTS											7		- "				
QUALITATIVE L Indicate estimated	IST abi	ING	G C)F A	.QU) = A	ATIC BIOTA bsent/Not Obser	ved, 1	= R	are,	. 2	= Co	ommon, 3= Abund	ant,	4 = }	Den	nina	nt
Periphyton					. 0	1 (2) 3 4		Sli	mes				(D)	1 1	2	3	4
Filamentous Algae					0	1 ② 3 4		Ma	croi	nve	rtebr	rates	9	1	2 ((3)	- ∡
Macrophytes					0	T) 2 3 4	_	Fis	h			-	0	1	(2)	3	4
FIELD OBSERVA Indicate estimated	ATI(ONS and:	S OI		0 =	bsent/Not Obse	erved, 1)~n* N7∧ [=]	ff∧ n æ Rare	~5 e (1·	P: ^ -3 or ms),	rganisms), 2 = Con , 4 = Dominant (>5	ımon 60 or	(3-! gan	9 Isms	i)	 -
Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2.	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	I	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria Hirudinea	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	I	2	3	4
Oligochaeta	0	1	2	3	4	Lepidoptera	0	I	2	3	4	-					
Isopoda	0	1 I	2 2	3	4	Sialidae Corydalidae	0	1	2	3	4	-					
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda					7	•	0	1	2	3	4						
Decapoua	0	1	2	3	4 1	Empididae	Λ	1	2	2	, i						
Gastropoda	0	1 1	2	3	4	Empididae Simuliidae	0 n	1	2	3	4						
-	-	_		3 3	4 4	Empididae Simuliidae Tabinidae	0 0 0	1 1 1	2 2 2	3 3 3	4 4	,					

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Co	ter Creek	LOCATION	Take	<u> </u>	
	RIVERMILE	STREAM CL	ASS	<u> </u>	
LAT	LONG	RIVER BASIN			
STORET #		AGENCY	·		····
INVESTIGATORS &	TB . W66				
FORM COMPLETED B	Y	DATE 4/8/	MPM	REASON FOR SURVEY	
WEATHER CONDITIONS	Now storm consistency shower %consistency %	n (heavy rain) (steady rain) s (intermittent) loud cover ear/sunny	Past 24 hours	Has there been a heavy rain in Yes Z No Air Temperature C Other	the last 7 days?
SITE LOCATION/MAP	Draw a map of the si	te and indicate t	ie areas sam	pled (or attach a photograph)	<u> </u>
-					•
	. ,				
	•		•		• .
	ų.				
		·			
TREAM CHARACTERIZATION	Stream Subsystem Perennial Inter	mittent O Tidal		tream Type I Coldwater	
	Stream Origin Glacial Non-glacial montane Swamp and bog	Spring-fed Mixture of Other		atchment Areakm²	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

-arter Creek 9/9/04 Station 2 10:30 m

WATERSHED FEATURES RIPARIAN VEGETATION (18 meter buffer)	Predominant Surrounding Landuse Forest	ì
INSTREAM FEATURES	Estimated Reach Length 90 m Estimated Stream Width 9 m Sampling Reach Area m ¹ Area in km ² (m ² x1000) km ² Estimated Stream Depth 0 m Surface Velocity m/sec (at thalweg)	Canopy Cover Partly open Partly shaded High Water Mark 1.5 m Proportion of Reach Represented by Stream Morphology Types Riffle 10 % Rum 10 % Pool 80 % Channelized Pes No recovering Dam Present Pes No
LARGE WOODY DEBRIS AQUATIC VEGETATION	LWD 4 m² Density of LWD m²/km² (LWD/ read procedure) Indicate the dominant type and record the dominant procedure and record the dominant procedure and pr	inant species present ☐ Rooted floating ☐ Free floating
WATER QUALITY	Temperature 66.3° 8 = Specific Conductance 491 amhos Dissolved Oxygen 8.60 mg/L pH 7.82 Turbidity 0.35 WQ Instrument Used Tro// 9000 ORP = 470	Water Odors Normal/None
SEDIMENT/ SUBSTRATE	Odors Normal	Deposits O Sludge O Sawdust Paper fiber O Sand Relict shells O Other Looking at stones which are not deeply embedded, are the undersides black in color? O Yes O No

INO	RGANIC SUBSTRATE (should add up to 1	COMPONENTS (00%)		ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)				
Substrate Diameter Type		neter % Composition in Sampling Reach		Characteristic	% Composition in Sampling Area			
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)				
Boulder	> 256 mm (10")			Hereriers (CLOIM)				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)				
Gravel	2-64 mm (0.1"-2.5")			(FFOM)				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments				
Silt	0.004-0.06 mm]					
Clay	< 0.004 mm (slick)]					

	لصقحا	24
O	(b)	70

Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 62.5

River Code: Site 2 RM: Stream: CATTLES Creek	
Date: 9/1/04 Location: Tater Rd Sife 7	
Scorers Full Name: (2) Street Affiliation: 13	
1] SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present	
TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY	
© D-BLDR /SL8S(10) GRAVEL [7] Check ONE (OR 2 & AVERAGE) Check ONE (OR 2 & AVERAGE)	
BOULDER [9] DESAND [6] DI-LIMESTONE [1] SILT: DI-SILT HEAVY [-2]	
======================================	Substrate
GIG-HARDPAN [4] GIG-DETRITUS[3] GI-WETLANDS[0] GI-SILT NORMAL [0]	
MUCK [2] ED-ARTIFICIAL[0] ARDPAN [0] SANDSTONE (0) ENTENDING [1]	[[4]
From Point Sources 1 - SARUSTONE [U] EMBEDDED 1 - EXTENSIVE [-2]	Max 20
NUMBER OF SUBSTRATE TYPES: 14 or More [2]	
40-b ADa. A-b. P P 1 / W	
(Migh Quality Only, score 5 or >)	
2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions) AMOUNT: (Check ONLY One or	
(Structure) TYPE: Score All That Occur check 2 and AVERAGE)	Cover
LENDERCLIT BANKS [1] POOLS > 70 cm [2] OXBOWS, BACKWATERS [1] D. EXTENSIVE > 75% [11]	
ZOVERNANGING VEGETATION [1] ZROOTWADS [1] AQUATIC MACROPHYTES [1] - MODERATE 25-75% [7]	[16]
A deput of any and any are accompany, and	Max 20
∠ ROOTMATS [1] COMMENTS: □ - NEARLY ABSENT < 5%[1]	
3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)	_
THE PARTY OF THE P	Channel
F- HIGH [4] G- EXCELLENT [7] G- NONE [6] G- HIGH [3] G- SNAGGING G- IMPOUND.	
MODERATE [3] GOOD [5] GRECOVERED [4] A MODERATE [2] GRELOCATION GREATS	[11]
- LOW [2] - FAIR [3] - RECOVERING [3] - LOW [1] - CANOPY REMOVAL - LEVEED	Max 20
G - NONE [1] G - POOR [1] G - RECENT OR NO. G - DREDGING G - BANK SHAPING	
RECOVERY [1] G - ONE SIDE CHANNEL MODIFICATIONS COMMENTS:	
Broken to the factor of the fa	ownstream
RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION R	ownstream Riparian
RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank)	
RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank) L R (Per Bank) L R (Per Bank) D D FOREST, SWAMP [3] D - NONE/LITTLE [3]	
RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank) D D-FOREST, SWAMP [3] D D-NONE/LITTLE [3] MODERATE 10-50m [3] D D-SHRUB OR OLD FIELD [2] D D-WBAN OR INDUSTRIAL [0]	Riparian 4. 5
RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank) L R (Per Bank) L R (Per Bank) L R (Per Bank) D D-FOREST, SWAMP [3] D D-SHRUB OR OLD FIELD [2] D D-WIDE - MARKOW 5-10 m [2] D D-RESIDENTIAL, PARK, NEW FIELD [1] D D-RESIDENTIAL, PARK, NEW FIELD [1] B BANK EROSION R (Per Bank) L R (Per Bank) L R (Per Bank) D D-NONE/LITTLE [3] D D-MODERATE [2]	Riparian 4. 5
RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank) L R (Per Bank) L R (Per Bank) L R (Per Bank) D D-FOREST, SWAMP [3] D D-SHRUB OR OLD FIELD [2] D D-WARROW 5-10 m [2] D D-RESIDENTIAL, PARK, NEW FIELD [1] D D-RESIDENTIAL, PARK, NEW FIELD [1] D D-RESIDENTIAL, PARK, NEW FIELD [1] B D-SHRUB OR OLD FIELD [1] D D-RESIDENTIAL, PARK, NEW FIELD [1] D D-RESIDENTIAL, PARK, NEW FIELD [1]	Riparian 4. 5
RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R (Per Bank)	Riparian 4. 5
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RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R (Per Ban	4. 5 Vax 10
RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R (Per Ban	4. 5 Vax 10
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RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank) R (Per Bank) L R (Per Bank) L R (Per Bank)	4. 5 Vlax 10
RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank	4. 5 Vlax 10
RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank) R (Per Bank) L R (Per Bank) L R (Per Bank)	4. 5 Vlax 10
RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank	4. 5 Vax 10
RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank	Pool/Current Aax 12
RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R (Per Ban	4. 5 Vax 10 Pool/ Current Aax 12
RIPARIAN WIDTH L R (Por Bank) L R (Most Predominant Per Bank) L R (Por Bank) R (Por Bank) L R (Por Bank) R (Por Bank) L R (Por Bank) R (Por Bank) L R (Por Bank)	Pool/Current Aax 12
RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank) R (Per Bank) L R (Per Bank) R (Per Bank) R (Per Bank) L R (Per Bank) R (Per Bank	Pool/Current Max 12 Max 12
RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank	Pool/Current Max 12 Max 8
RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank) P Noberate [2] L None [2] L	Pool/Current Max 12 Max 8
RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R (Per Bank)	Pool/Current Max 12 Max 8
RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R (Per Ban	Pool/Current Max 12 Iffle/Run Sradient

Macrobenthos Qualitative Sample List

- 11	ORDER	FAMILY	GENUS	SPECIES	COUNT	TOLERANCE VALUES	FBI	
- 15	Nematomorpha						0.000 F	Parasite Predators/Parasite
. 1	Hydracarina-Trombidiformes	Discourie			2	4	0.000 F	Predators/Parasite Omnivore
	Tubellaria	Planaria			2	4	0.083	Official
H	Porifera	Spongillidae	PH	lul.			0.000 F	Hters
	Pelecypoda		Villosa	iris		3.2	0.000 F	ilters
25			Corbicula	fluminea				
١,		Sphaerlidae				8	0.000 F	
ı		Dreissenidae	Dreissena	polymorpha			0.000 F	fiters
- [Gastropoda	Ancylidae				6	0.000 \$	Scrapers
-[Lymnaeidae				6.9	0.000 \$	Scrapers
-[Lymnaeidae	Fossaria			2.6	0.000 \$	Scrapers
6		Physidae				8	0.000 \$	Scrapers
1			Physella			8	0.000 5	Scrapers
29		Planorbidae				7	0.000 \$	Scrapers
- 1		Planorbidae	Planorbula			7	0.000 5	Scrapers
7		Pleuroceridae			4		0.000 5	Scrapers
		Bithyniidae	Bithynia	tentaculata			0.000 5	Scrapers
- 1	Annelida	Oligochaeta					0.000	Gathers
31	2 (2) 11 (10) 11 (10) 12	Hirudinea				10	0.000	Gathers
	Decapoda	-			2	8	0.167	Predators Shredders
20	Amphipoda				10	4	0.417	Shredders
	Isopoda	Asellidae				8	0.000	Shredders
-	Ostracoda					8	0.000	Scavengers
	Ephemeroptera	Caenidae				7	0.000	Gathers
3	Ергингин орчин и	Caenidae	Caenis			3.1	0.000	Gathers
		Ephemeridae	Hexagenia			3.6	0.000	Gathers
11		Baetidae	r remerger ner		13	4	0.542	Gathers
		Baetidae	Baetis		10	3.1	0.000	Gathers
ď		Baetidae	Baetis	brunneicolor		4	0.000	Gathers
				brunneicolor		2.7		
П		Baetidae	Baetis	intercalaris		5.6	0.000	Gathers
20		Baetidae	Calibaetis		2	3.1	0.000	Gathers Scrapers
21		Heptageniidae	Stenacron	allderela	2			
		Heptageniidae	Stenacron	gildersleevei		3.1	0.000	Scrapers
9		Heptageniidae	Stenonema	-4	1	4	0.042	Scrapers
ø		Heptageniidae	Stenonema	exiguum		1.9		Scrapers
		Siphlonuridae				7	0.000	Gathers
ø		Ephemerellidae	Timpanoga			1	0.000	Gathers
		Leptophlebiidae				2	0.000	Gathers
		Leptohyphidae	Tricorythodes			2.7	0.000	Gathers Filters
10		Isonychiidae	Isonychia			2	0.000	Filters
	Coleoptera	Dytiscidae				5	0.000	Predators
2		Gyrinidae				5	0.000	Predators
8		Gyrinidae	Dineutus			3,7	0.000	Predators
22		Haliplidae			1	7	0.073	Predators
		Dryopidae				5	0.000	Predators
24		Elmidae			9	4	0.375	Gathers
12		Psephenidae	Psephenus		7	4	0.392	Scraners
		Hydrophiloidae	1 auginorius		1	-	0.000	Scrapers Gathers
		Hydrophiloidae	Tropisternus				0.000	Gathers
14	Megaloptera	Corydalidae	Corydalus		-	4	0.000	Predators
15	Megacoptera	Corydalidae		-	1	4	0.000	Predators
10		Sialidae	Nigronia		-	4		
	Total colors		Deschioseshio.	-	-	1	0.000	Predators
	Trichoptera	Brachycentridae	Brachycentrus	-	-		0.000	Commers
17		Helicopsychidae	Helicopsyche		-	3	0.000	Scrapers
		Helicopsychidae	Helicopsyche	borealis	- 10	3	0.542	Scrapers
27		Hydropsychidae		-	13	4	0.542	Filters
		Hydropsychidae	Hydropsyche		-	4	0.000	Filters
		Hydropsychidae	Hydropsyche	betteni		4	0.000	Filters
		Hydropsychidae	Hydropsyche	scalaris		4	0.000	Filters
		Hydropsychidae	Symphitopsyche			4	0.000	Filters
		Hydroptlidae				4	0.000	Gathers
		Hydroptilidae	Hydroptila			3.2	0.000	Gathers
		Leptoceridae				4	0.000	Shredders
		Leptoceridae	Nectopsyche			4	0.000	Shredders
		Molannidae	, roompojono			6	0.000	Gathers
26		Odontoceridae				0	0.000	
-		Philopotamidae				3	0.000	Filters
33			Chimerre		3	4	0.000	Filters
33		Philiopotamidae Physicanidae	Chimarra		1 3	4		
		Phryganeidae	Hagenella	-	-	8	0.000	Shredders
		Polycentropodidae	Cyrnelius		1	2	0.000	Gathers
20	Mamintera	Psychomylidae Relostometidae	Lype		-	2		
30	Hemiptera	Belostomatidae	Deloctores		-		0.000	Predators Predators
		Belostomatidae	Belostoma		-		0.000	Predators Predators
5		Cortridge			3	10	0.000	Predators Predators
2		Gerridae	Transhatas	-	3	5	0.156	Predators Predators
		Gerridae	Trepobates	-	-	5	0.000	Predators
		Nepidae	Panatra	-	-		0.000	Predators Predators
		Nepidae	Ranatra		-		0.000	Predators
-		Notonectidae	Notonecta	-	-	-	0.000	Predators
4		Velidae	Rhagovelia		-	-	0.000	Predators
	Plecoptera	Chloroperlidae		-	-	1	0.000	Predators
		Perlidae	Perlesta		-	1	0.000	Predators
		Perlidae	Neoperla			1	0.000	Predators
		Perlidae	Claassenia		5	1	0.052	Predators
8		1 A nahadan			2	3	0.063	Predators
	Odonata-Anisoptera	Aeshnidae				3	0.000	Predators
		Aeshnidae	Boyeria			9		Decidetase
			Boyeria			1	0.000	Predators
		Aeshnidae Gomphidae	Boyeria					
	Odonata-Anisoptera	Aeshnidae Gomphidae Cordulegastridae Cordulidae	Boyeria			1	0.000	Predators
1	Odonata-Anisoptera	Aeshnidae Gomphidae Cordulegastridae Cordulidae	Boyeria			1 3	0.000	Predators Predators
1	Odonata-Anisoptera	Aeshnidae Gomphidae Cordulegastridae Cordullidae Libellulidae	Boyeria			1 3 5	0.000 0.000 0.000	Predators Predators Predators
28	Odonata-Anisoptera Odonata-Zygoptera	Aeshnidae Gomphidae Cordulegastridae Corduliidae Libellulidae Calopterygidae			3	1 3 5 9 5	0.000 0.000 0.000	Predators Predators Predators Predators
1	Odonata-Anisoptera Odonata-Zygoptera	Aeshnidae Gomphidae Corduliegastridae Corduliidae Libelfulidae Libelfulidae Calopterygidae Calopterygidae	Boyeria Calopteryx		3	1 3 5 9 5 3,7	0.000 0.000 0.000 0.000 0.116	Predators Predators Predators Predators Predators
28	Odonata-Anisoptera Odonata-Zygoptera	Aeshnidae Gomphidae Cordulegastridae Cordullidae Libellulidae Libellulidae Calopterygidae Calopterygidae Coenagrionidae	Calopteryx			1 3 5 9 5 3.7 6.1	0.000 0.000 0.000 0.000 0.116 0.000	Predators Predators Predators Predators Predators Predators Predators
28	Odonata-Anisoptera Odonata-Zygoptera	Aeshnidae Gomphidae Cordulegastridae Cordulidae Libellulidae Libellulidae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae	Calopteryx		3	1 3 5 9 5 3.7 6.1 5.1	0.000 0.000 0.000 0.000 0.116 0.000	Predators Predators Predators Predators Predators Predators Predators Predators
28	Odonata-Anisoptera Odonata-Zygoptera	Aeshnidae Gomphidae Cordulegastridae Cordulidae Libellulidae Calopterygidae Calopterygidae Coengrionidae Coengrionidae Coengrionidae Coengrionidae	Calopteryx			1 3 5 9 5 3.7 6.1 5.1	0.000 0.000 0.000 0.000 0.116 0.000 0.159 0.000	Predators
28	Odonata-Anisoptera Odonata-Zygoptera	Asehnidae Goruphidae Cordulegastridae Cordulidae Libelfulidae Libelfulidae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae Coenagrionidae Lestidae	Calopteryx			1 3 5 9 5 3.7 6.1 5.1 9	0.000 0.000 0.000 0.000 0.116 0.000 0.159 0.000 0.000	Predators
28 2 19	Odonata-Anisoptera Odonata-Zygoptera Diptera	Asehnidae Gomphidae Cordulegastridae Cordulidae Libelfulidae Libelfulidae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae	Calopteryx			1 3 5 9 5 3,7 6,1 5,1 9 9	0.000 0.000 0.000 0.116 0.000 0.159 0.000 0.000	Predators Gathers Gathers
28 2 19 35	Odonata-Anisoptera Odonata-Zygoptera Diptera	Asehnidae Goruphidae Cordullegastridae Cordullegastridae Cordullidae Lizefullidae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae Coenagrionidae Lestidae Cartopogonidae Blood-red Chironomidae	Calopteryx		3	1 3 5 9 5 3,7 6,1 5,1 9 0 5,7	0.000 0.000 0.000 0.116 0.000 0.159 0.000 0.000 0.000 0.000	Predators Gathers Gathers
1 28 2 19	Odonata-Anisoptera Odonata-Zygoptera Diptera	Asehnidae Gomphidae Cordulegastridae Cordulegastridae Cordulegastridae Libelfuldae Libelfuldae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Goratopogonidae Justidae Goratopogonidae Blood-red Chironomidae Other Chironomidae	Calopteryx		1 12	1 3 5 9 5 5 3,7 6,1 5,1 9 9 9,5,7 8,1 6	0.000 0.000 0.000 0.000 0.116 0.000 0.159 0.000 0.000 0.000 0.000 0.000	Predators Gathers Gathers Gathers
28 2 19 35	Odonata-Anisoptera Odonata-Zygoptera Diptera	Aeshnidae Cordulagastridae Cordulagastridae Cordulagastridae Cordulidae Libelluldae Caloptenyidae Caloptenyidae Caloptenyidae Coenagrionidae	Calopteryx		3	1 1 3 5 5 5 5 7 6 1 6 1 6 7 7 8 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	0.000 0.000 0.000 0.116 0.000 0.159 0.000 0.000 0.000 0.000 0.000 0.083	Predators Gathers Gathers Gathers Sathers Sathers Sathers
1 28 2 19 35 16	Odonata-Anisoptera Odonata-Zygoptera Oliptera	Aesthnidae Gomphidae Gomphidae Cordulidae Libellulidae Libellulidae Calopteryjidae Calopteryjidae Calopteryjidae Coenagrionidae Coenagrionidae Coenagrionidae Lestidae Geretboogonidae Blood-red Chinonemidae Other Chinonemidae Culicidae Simulidae	Calopteryx		1 1 12 1	1 3 5 9 5 5 3,7 6,1 5,1 9 9 5,7 8,1 6 8	0.000 0.000 0.000 0.115 0.000 0.159 0.000 0.000 0.000 0.000 0.000 0.084 0.750 0.083	Predators Gathers Gathers Sathers Shredders Filters
1 28 2 19	Odonata-Anisoptera Odonata-Zygoptera Oliptera	Aeshnidae Cordulagastridae Cordulagastridae Cordulagastridae Cordulidae Libelluldae Caloptenyidae Caloptenyidae Caloptenyidae Coenagrionidae	Calopteryx		1 12	1 1 3 5 5 5 5 7 6 1 6 1 6 7 7 8 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	0.000 0.000 0.000 0.116 0.000 0.159 0.000 0.000 0.000 0.000 0.084 0.750 0.083	Predators Gathers Gathers Gathers Sathers Sathers Sathers

TAXA RICHNESS	22
FBI	4.289
Scraper/Filter	0.875
EPT/Chironomidae	2.846
% Contribution of Dominant Taxa	0.130
EPT Index	6.000
Community Similarity Indices	0.000
	1.000
CPOM	0.110
Total Number Collected	100

Comm. Loss = 0 Jaccard Coef. = 1

CPOM Total Number Collected total shredders

BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (FRONT)

		page of
STREAM NAME LOST RIVER	<u> </u>	LOCATION LOST River at Tater RU
STATION# <u>3</u>	RIVERMILE	STREAM CLASS
LAT	LONG	RIVER BASIN
STORET#		AGENCY
COLLECTED BY ESB. WEL	DATE_9/\$/04	LOT#
TAXONOMIST WEL	DATE // 3/0	SUBSAMPLE TARGET 100 1 200 1 300 1 Other

<i>)</i> / o	rganisms	'	No.	LS	TI	TCR	1		No.	LS	TI	TCR	1
Digochaeta							Megaloptera	- or Une W	7	1	wgt		
· · · · · · · · · · · · · · · · · · ·								Nigron	32	I	١٥٥	1	↓ 、
lirudinea	<u></u>			<u> </u>		<u></u>	Coleoptera Kittle-		9/4	Ţ	wĢL	1	>-ورس
				-	 	<u> </u>	Longton - III	HUMINI	17	<u>A</u>	CYL		₹
opoda		!	\bigsqcup	<u> </u>	 	 '	Water way	MU111+43	40	II	n#		4
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mphipoda	unun (74	Ą	ساؤل	1	Diptera Bracker - J		2	エイ	WEL.	1	┨.
<u>·</u>	1 - 201 - 3		 			 	Crave - []	<u> (/)</u>	<u> </u>	I	سادد	1	1
ecapoda	WIII	<u> </u>	7	Α	u (C		F	 	+	 			
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-	<u> </u>	(4)		12 T	ان در	+-	┨. ⊢		#	-	W6L	J	1
7-3	Steronoma		V.	L L	سالات	 	Pelecypoda -	of a	12	A	سلاد	1,	1
lecoptera	TH MI	3	LAY	7	mer mer		-	111	4			+	1
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,					\Box	<u> </u>	Other Ottorota -	MT (Z) K	7	UL	1	- Aeshr
ı							Colipter du	-11 (1	E	I	Ų61	. 1	
							Coengrate	-H111 (3	27	工	V 61]
richoptera H&	0-147	②	1	I.	სა€C	1	Planaria 1	MM (3) 16	Pi	WEL	. 1]
Helicopsych	11744-son	וואעוו	Z	I	W6L] (4			L_]
Unkaoum -	וואיניאי	<u>(B)</u>	1/2	I	u GL	1/	Ph. bpotem 1	<u>e</u>	Д	丄	<u> </u>	<u> </u>	_
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emiptera -		(Z)	18	A	WGC	┼┴╾	- }	•	+-	┼	\vdash	 	-
			 	┼	 	├ ──	i ⊢	- :	+	┼—	┼	┼	4.

Total No. Organisms

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

LOCATION

Tater 80

STREAM NAME 🗸

			IG.				RIVE	RBASIN	1												
LAT	:	LATLONG									_ RIVER BASIN										
STORET#							AGEN	CY					-								
INVESTIGATORS	W	066		٤3	-B		-					Т	LOI	NUMBER		_					
FORM COMPLETE	_		-		/		DATE					\dagger		SON FOR SURVEY	·						
		ε	Γß				TIME	3:	<u> </u>	АМ	<u> </u>	2									
HABITAT TYPES	11 7	a rCo	bble) %	entage of Sna rophytes	123 5	_% .	pe p ∠Zr∨	resi	tated	l Bar Othe	niks_	5 % Z Sand	<u>⊃o</u> %						
SAMPLE	7	Gear	· use	d J	1D-2	frame C	kick-n	et		ø(Other		Sw	-ber							
COLLECTION	1					nples coll			-				m ba		—- 						
	1					er of jab		. *		-				- 10111							
· .	11/2	ΓCo	bbie		•	Sna rophytes	es 5	- 4	ZV	ege	tated	Bar Other	ıks	5 Sand	<u>3</u>						
GENERAL COMMENTS														-		•					
QUALITATIVE I	L IST	IN	G .0)FA	OU	ATIC B	IOTA		<u>-</u>		_			<u>,,,</u>							
QUALITATIVE I Indicate estimated Periphyton Filamentous Algae	IST abı	IN(G C	OF A	QU) = 4	Absent/N	IOTA lot Ob	served,		Slir	nes			mmon, 3= Abuno	dant,	1 1	Don 2 (2)	3 3	nt 4 4		
Indicate estimated Periphyton	IST abı	Ind	G C	OF A	. 0	Absent/N	ot Ob	served,		Slir	nes croi	nve	tebr	ates	dant,	1 1 1	Don 2 (2) (2)		4		
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Periphyton Filamentous Algae Macrophytes FIELD OBSERVA Indicate estimated	ADI	ONS	ance	e: (. 0 0 0 ACI	l 2 2 1 2 1 2 ROBEN Absent/	3 4 3 4 3 4 THOS Not Oi, 3= Al	served,	d, 1	Slir Ma Fisl	mes croi h	nve M:~ e (1-	ow.	ates S ganisms), 2 = Co	O O	1 1 1	2 (2)	3 3) 3	4		
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Periphyton Filamentous Algae Macrophytes FIELD OBSERVA Indicate estimated Porifera Hydrozoa Platyhelminthes	ATTO abo	ONS 2nd:	2 2 2	3 3 3	. 0 0 0 0 ACI 0 = org	l 2 2 1 2 ROBEN' Absent/ Anison Zygop Hernip	Obt Ob 3 4 3 4 3 4 THOS Not Oi, 3= Al otera tera	served,	d, 1 it (>	Slin Ma Fisi	mes croi h // Rare orga	N (1-s) (1-s)	3 or ms),	ates S ganisms), 2 = Co 4 = Dominant (> Chironomidae	0 0 mmon 50 or	1 1 1 (3-gan	2 (2) (2) sisms	3 3 3 3 3	4 4 4		
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Periphyton Filamentous Algae Macrophytes FIELD OBSERVA Indicate estimated Porifera Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta Isopoda Amphipoda Decapoda	0 0 0 0 0 0 0	I 1 1 1 1 1 1 1	2 2 2 2 2 2 2 2 2 2	3 3 3 3 3 3 3 3	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Absent/N 1 2 1 2 1 2 1 2 ROBEN' Absent/ Anison Zygop Hemip Coleon Lepido Sialida Coryd: Tipulik Empid	THOS Not Of Section 2 tera etera ete	served,	d, 1 it (> 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Slir Ma Fisl 10 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Rarrer 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	3 3 3 3 3 3 3 3	3 or ms), 4 4 4 4 4 4 4	ganisms), 2 = Co 4 = Dominant (> Chironomidae Ephemeroptera Trichoptera	0 0 50 or 0 0	1 1 1 (3-gan	2 2 2 2 9 isms 2 2 2	3 3 3 3 3 3	4 4 4 4		

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

	· · ·				
	st River	LOCATION	Tecter R	J	
STATION#	IVERMILE	STREAM CLA			
LATL	ONG	RIVER BASIN	T		
STORET #		AGENCY			
· · · · · · · · · · · · · · · · · · ·	3B W62	_			
FORM COMPLETED BY		DATE 9/1/04	54 № 600 РМ	REASON FOR SURVEY	**
WEATHER CONDITIONS	nain ((heavy rain) steady rain) (intermittent) oud cover	Past 24 hours	Has there been a heavy rain in O Yes No Air Temperature °C Other	the last 7 days?
	Ø cle	ar/sunny	<u> </u>	<u> </u>	
SITE LOCATION/MAP	Draw a map of the sit	e and indicate ti	te areas sam	pled (or attach a photograph)	
	• • • •		·		
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					*
	·		- · · ·		
	Stream Subsystem Perennial Inten Stream Origin Clacial Non-glacial montane Swamp and bog	D Spring-fed	. (Stream Type Coldwater Catchment Areakm²	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

9/9/04 Station 3 11:00 m

WATERSHED FEATURES	Forest D Commercial	Local Watershed NPS Pollution No evidence Some potential sources Obvious sources Local Watershed Erosion None Moderate Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the domina Indicate the dominant type and record the domina Indicate the dominant type and record the domina	ant species present Grasses • Herbaceous
INSTREAM FEATURES	Estimated Reach Length 90 m Estimated Stream Width 9 m Sampling Reach Area m² Area in km² (m²x1000) km² Estimated Stream Depth m Surface Velocity m/sec (at thalweg)	Canopy Cover Partly open Partly shaded Shaded High Water Mark m Proportion of Reach Represented by Stream Morphology Types Riffle % Run % Pool % Channelized Yes No
LARGE WOODY DEBRIS	LWD Z m² Density of LWDm²/km² (LWD/ reac	h area)
AQUATIC VEGETATION	Indicate the dominant type and record the dominant of Rooted emergent Rooted submergent Attached Algae Attached Algae dominant species present Portion of the reach with aquatic vegetation	G Rooted Hotting G Pres Hotting
WATER QUALITY	Temperature 68.8gF Specific Conductance 458 MMN05 Dissolved Oxygen 8.53 mg/L pH 7.96 Turbidity 6.1 WO Instrument Used 17011 9000, 60MH0 ORP = 455	Water Odors Normal/None Sewage Chemical Petroleum Other
SEDIMENT/ SUBSTRATE	Odors Normal Sewage Petrojeum Chemical Anaerobic None Other Oils Absent Slight Moderate Profuse	Deposits Sludge Sawdust Paper fiber Sand Relict shells Other Looking at stones which are not deeply embedded, are the undersides black in color? Yes No
INORGANIC SU	BSTRATE COMPONENTS OI	RGANIC SUBSTRATE COMPONENTS

INO	RGANIC SUBSTRATE	COMPONENTS	ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)						
Substrate Type	Dizmeter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area				
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)					
Boulder	> 256 mm (10")		<u> </u>	IIMCHAIS (CT ON)	<u></u>				
Cobble	64-256 mm (2.5"-10")"		Muck-Mud	black, very fine organic (FPOM)					
Gravel	2-64 mm (0.1"-2.5")		·	(11014)					
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments					
Silt	0.004-0.06 mm								
Clay	< 0.004 mm (slick)		<u> </u>						

ChieEPA	- Guantativo Ha			x Field	Sheet QHEI Scor	e: 68
River Code:	RM:St	ream: Lo				
Date: 9/9/04		4 3	Tater Re			
Scorers Full Name;	Ed Belmente A	ffillation:_	V3			
1] SUBSTRATE (Check	ONLY Two SubstrateTY	PE BOXES;	Estimate % preser	nt		
<u>ITPE</u> POO	DL RIFFLE	POOL RIFFI	LE <u>SUBSTRATE OR</u>	IGIN	SUBSTRATE QUALITY	
□ □-BLOR /SLBS[10]	GRAVEL [7]	_	Check ONE (OR 2 & A	WERAGE)	Check ONE (OR 2 & AVERA	GE)
DD-BOULDER [9]	[6]		LIMESTONE [1		SILT HEAVY [-2]	OL)
COBBLE [8]	DBEDROCK[5]		O-TILLS [1]	,	SILT MODERATE [-1]	Substra
DELHARDPAN [4]	🗗 🖾 DETRITUS[3]		-WETLANDS[0]		SILT NORMAL [0]	
DIMUCK [2]	DO-ARTIFICIALIO	<u>1 </u>	HARDPAN [0]		SILT FREE [1]	ן רון
DIE-SILT [2]	NOTE: Ignore Sludge From Point Sources	Originating	-SANDSTONE [O EMBEDD	ED D EXTENSIVE [-2]	• ====
AUTOCO OF CURETA			-RIP/RAP [0]	NESS:	-MODERATE [-1]	Max 20
NUMBER OF SUBSTRATE (High Quality Only, Score	_ , /	3	-LACUSTRINE (0)]	NORMAL [0]	
	5 or >)		☐ -SHALE [-1]		□-NONE [1]	
COMMENTS			_E-COAL FINES [-2]		
(Structure)	(Give each cover type a s	core of 0 to	3; see back for inst	ructions)	AMOUNT: (Check ONLY On	e or
XUNDERCUT BANKS [1]	TYPE: Score A				check 2 and AVERAGE)	Cover
SOVERHANGING VEGETA	XPOOLS»	70 cm [2]	OXBOWS, BACK		D - EXTENSIVE > 75% [11]	
XSHALLOWS (IN SLOW W			AQUATIC MACRO	PHYTES [1]	MODERATE 25-75% [7]	[16]
X ROOTMATS [1] CON	ATER) [1] X BOULDER	R [1]	LOGS OR WOOD	Y DEBRIS [1]	☐ - SPARSE 5-25% [3]	Max 20
3] CHANNEL MORPHO		- DED 0-4-			☐ - NEARLY ABSENT < 5%[1]
	ELOPMENT CHANNEL	18 PER Cate	gory OR check 2 a			
	EXCELLENT [7] II NONI		STABILITY		IONS/OTHER	Channel
		- [0] VERED [4]	13 HIGH [3]	□ - SNAGG		
		VERING [3]	MODERATE [2			[[17]]
	LLMTF. 🗸 🗸	NT OR NO	□ - ŁOW [1]		Y REMOVAL . LEVEED	Max 20
	RECOVER		•	- DREDG		3
COMMENTS:		er. Lig		TI - ONE 21	DE CHANNEL MODIFICATIONS	
4]. RIPARIAN ZONE AND	BANK EROSIONcheck	ONE box per l	ank or chack 2 and A	WEDAOE	sant April 1	_
RIPARIAN WIDTH	FLOOD	PLAIN QUA	LITY (PAST 100 Met	verage per tor DIDADIAN		Downstre
L R (Per Bank)	L R (Most Predomina	nt Per Bank)	L R	<u>ÇI KIFAKIAN</u>		Riparian
□ WIDE > 50m [4]	☐ EFOREST, SWAMP [3]	- CONSERVA	TION TILLAGE	L R (Per Bank) [1] □ □ NONE/LITTLE [:	,
MODERATE 10-50m [I DISHRUB OR OLD FLE	LD [2]	☐ ☐ -URBAN OF	IMPUSTRIAL	[0] MODERATE MI	<u> </u>
12 - NARROW 5-10 m [2]	THE RESIDENTIAL, PARK	NEW FIELD	[1] IN EN OPEN PAS	TURE.ROWCR	OP [0] II HEAVY/SEVERE	Max 10
mind: amen realisationer or rate	1) 🗖 🖪 · FENCED PASTURE	(f)	D D-MINING/C	ONSTRUCTION	N FOI	.4
■TE - NONE [0]						
COMMENTS:						
E18641 (01 ISS 1115						-
5.]POOL/GLIDE AND RIF						Pool/
MAX. DEPTH	MORPHOLOGY		CURRE	NT VELOCITY	POOLS & RIFFLESI]	Current
(Check 1 ONLY!)	(Check 1 or 2 & AVE	RAGE)		(Check All	That Apply)	
M - >1m [6] M - 0.7-1m [4]	POOL WIDTH > RIFFLE V	VIDTH [2]	☐ -EDDIES[1]		TORRENTIAL[-1]	10
	D POOL WIDTH - RIFFLE W	(1) HTGN	[] FAST[1]		INTERSTITIAL[-1]	ريدي
D - 0.2- 0.4m [1]	EI-POOL WIDTH < RIPFLE W	v. [6]	M. MODERATE	[1]	INTERMITTENT[-2]	Max 12
	COMMENTS:		E -SLOW [1]	□-	VERY FAST[1]	
						
	CUE	CK ONE OF				Riffle/Run
RIFFLE DEPTH	RUN DEPTH		CHECK 2 AND AV			- Cunsorrun
Best Areas >10 cm [2]	□ · MAX > 50 [2]		E/RUN SUBSTRATE		FLE/RUN EMBEDDEDNESS	
Best Areas 5-10 cm[1]	MAX < 50[1]	MENON I	E (e.g.,Cobble, Bot	nger) [2]	- NONE [2]	ليتي
☐ · Best Areas < 5 cm	ment - notil	TLI INICTA	STABLE (e.g.,Large	Gravel) [1]	■- LOW [1]	Max 8
FRIFFLE=01		E-ORSTA	BLE (Fine Gravel, S	ana) [V]	□ - MODERATE [0]	Gradient

am f ☐ - EXTENSIVE [-1] COMMENTS:_ _CI - NO RIFFLE [Metric=0] 6] GRADIENT (ft/mi): _____DRAINAGE AREA (sq.mi.) :__ %POOL: %GLIDE: %RIFFLE %RUN: * Best ares must be large enough to support a population of riffic-obligate species EPA 4520 06/24/01

ORDER Nemetomorphe	FAMILY	GENUS	SPECIES	COUNT	TOLERANCE VALUES	FBI	00	Parasite
Nematomorpha Hydracarina- Trombidiformes								Predators/Paras
Tubellaria	Planaria			3	4	0.0	40	Omnivore
Porifera				-	7	0.1	00	Filters
	Spongilidae	Villosa	iris	-		0.0	00	Filters
Pelecypoda	Unionidae			1	3.2	0.0	40	Filters
	Corbiculidae	Corbicula	fluminea					
	Sphaeriidae	-			8	0.0	00	Filters
	Dreissenidae	Dreissena	polymorpha					Filters
Gastropoda	Ancylidae				6	0.0	000	Scrapers
	Lymnaeidae				6.9			Scrapers
	Lymnaeidae	Fossaria			2.6	0.0	000	Scrapers
	Physidae				8	0.0	000	Scrapers
	Physidae	Physella			8	0.0	000	Scrapers
	Planorbidae				7	0.0	000	Scrapers
	Planorbidae	Planorbula			7	0.0	000	Scrapers Scrapers
	Pleuroceridae			19		0.0	000	Scrapers
	Bithyniidae	Bithynia	tentaculata	10		0.0	100	Scrapers
Annelida		Charyran	CONTROL GREENER			0.0	100	Gathers
Armenda	Oligochaeta Hirudinea			-	10			Gathers
Decapoda	FIII GUIFIER			2	8	0.0	108	Predators
Amphinada				3	4	0.1	148	Shredders
Amphipoda	Asellidae			- 3	8			Shredders
Isopoda	Aselidae			-	8	0.0	200	Communication
Ostracoda	Consider			-	0 7	0.0	200	Scavengers
Ephemeroptera	Caenidae	0	-	-	24	0.0	000	Gathers
	Caenidae	Caenis		+	3.1	0.0	200	Gathers
	Ephemeridae	Hexagenia		-	3.6	0.0	000	Gathers
	Baetidae	Dootle		1	4	0.0	249	Gathers
	Baetidae	Baetis	harmed 1	-	3.1			Gathers
	Baetidae	Baetis	brunneicolor	-	4	0.0	000	Gathers
	Baetidae	Baetis	intercalaris		2.7	0.0	100	Gathers
	Baetidae	Callibaetis			5.6	0.0	000	Gathers
	Heptageniidae	Stenacron		3	3.1	0.1	115	Scrapers
	Heptageniidae	Stenacron	gildersleevei		3.1	0.0	000	Scrapers
	Heptageniidae	Stenonema		4	4	0.1	198	Scrapers
	Heptageniidae	Stenonema	exiguum		1.9	0.0	000	Scrapers
	Siphlonuridae				7	0.0	000	Gathers
	Ephemerellidae	Timpanoga			1	0.0	000	Gathers
	Leptophlebiidae				2			Gathers
	Leptohyphidae	Tricorythodes			2.7	0.0	000	Gathers
		Isonychia		2	2	0.0	040	Filters
Coleoptera	Dytincides Dytincides	- Aryonau		1	5			Predators
Coleoptera	Dytiscidae			1	5	0.0	000	Predators
	Gyrinidae Gyrinidae	Dineutus		1	3.7	0.0	000	Predators Predators
		Dineutus	-	-	3.7	0.0	200	Predators
	Haliplidae		-	-	5	0.0	2000	Predators
	Dryopidae		-	10				
	Elmidae	0 1		10	4	0.4	494	Gathers
	Psephenidae	Psephenus		20	4	0.9	988	Scrapers
	Hydrophiloidae			-		0.0	000	Gathers
	Hydrophiloidae	Tropisternus		-		0.0	000	Gathers
Megaloptera	Corydalidae	Corydalus		1	4			Predators
	Corydalidae	Nigronia		1	4	0.0	049	Predators
	Sialidae			-	4	0.0	000	Predators
Trichoptera	Brachycentridae	Brachycentrus			1	0.0	000	Filters
	Helicopsychidae	Helicopsyche		6	3	0.2	222	Scrapers Scrapers
	Helicopsychidae	Helicopsyche	borealis		3	0.0	000	Scrapers
	Hydropsychidae			2	4	0.0	099	Filters
	Hydropsychidae	Hydropsyche			4	0.0	000	Filters Filters
	Hydropsychidae	Hydropsyche	betteni		4	0.0	000	Filters
	Hydropsychidae	Hydropsyche	scalaris		4	0.0	000	Filters
	Hydropsychidae	Symphitopsyche			4	0.0	000	Filters Gathers
	Hydroptilidae				4	0.0	000	Gathers
	Hydroptilidae	Hydroptila			3.2	0.0	000	Gathers
		T Type opens		_	4	0.0	000	Shradders
	Leptoceridae Leptoceridae	Nectopsyche			4	0.1	000	Shredders Shredders
	Molannidae	- country of the			6	0.1	000	Gathers
	Odostocaridas				0		000	Outres 3
	Odontoceridae		-	1	3	0.1	000	Filters
	Philopotamidae	Chimana	-	-				
	Philiopotamidae	Chimarra	-	8	4	0.1	200	Filters
	Phryganeidae	Hagenella	-	-	4	0.0	000	Shredders
	Polycentropodidae	Cyrnellus	-	-	6			Filters
	Psychomylidae	Lype		-	2	0.0	000	Gathers
Hemiptera	Belostomatidae	D. Landau		-		0.1	000	Predators
	Belostomatidae	Belostoma		-	-	0,1	000	Predators
	Corixidae		-	-	10	0.1	000	Predators
3	Gerridae	-		2	5	0.	123	Predators
	Gerridae	Trepobates			5	0.1	000	Predators
	Nepidae					0.	000	Predators
	Nepidae	Ranatra						Predators
	Notonectidae	Notonecta				0.	000	Predators
	Veliidae	Rhagovelia				0.	000	Predators
Plecoptera	Chloroperlidae				1	0.	000	Predators
ROSSISSION CONTRACTOR	Perlidae	Perlesta			1	0.	000	Predators
	Perlidae	Neoperla			1	0.	000	Predators
	Perlidae	Claassenia		3	1	0	037	Predators
	Aeshnidae			2	3	0.	074	Predators
Odonata-Anisoptera	Aeshnidae	Boyeria		-	3	0	000	Predators
Odonata-Anisoptera		DOYOT IS			3	0.	000	Predators
Odonata-Anisoptera			-	-	1	0.	ACC.	Dradators
Odonata-Anisoptera	Gomphidae	-		-	3	0.	000	Predators Predators
	Gomphidae Cordulegastridae				1 5			
	Gomphidae Cordulegastridae Cordulidae			_			000	Predators
3	Gomphidae Cordulegastridae Corduliidae Libellulidae				9	0.		
3 Odonata-Zygoptera	Gomphidae Cordulegastridae Cordulidae Libellulidae Calopterygidae				5	0.	.000	Predators
3 Odonata-Zygoptera	Gomphidae Cordulegastridae Cordulidae Libellulidae Calopterygidae	Calopteryx		1	9 5 3.7	0.	.046	Predators Predators
3 Odonata-Zygoptera	Gomphidae Cordulegastridae Cordulidae Libellulidae Calopterygidae Calopterygidae	Calopteryx			5 3.7 6.1	0.	000	Predators Predators
Odonata-Zygoptera	Gomphidae Cordulegastridae Cordulidae Libellulidae Libellulidae Calopterygidae Calopterygidae Coenagrionidae			1 2	5 3.7 6.1 5.1	0. 0. 0.	.046 .000	Predators Predators Predators Predators
Odonata-Zygoptera	Gomphidae Cordulegastridae Cordulidae Libellulidae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae	Argia			5 3.7 6.1 5.1	0. 0. 0.	.046 .000 .126	Predators Predators Predators Predators Predators
Odonata-Zygoptera	Gomphidae Cordulegastridae Cordulidae Libellulidae Libellulidae Calopterygidae Calopterygidae Coenagrionidae				5 3.7 6.1 5.1 9	0. 0. 0. 0.	.046 .000 .126 .000	Predators Predators Predators Predators Predators Predators Predators
Cdonata-Zygoptera	Gomphidae Corduligaeridae Cordulidae Cordulidae Libelfuldae Calopterygidae Calopterygidae Conagrionidae Coenagrionidae Coenagrionidae Lestidae	Argia			5 3.7 6.1 5.1 9	0. 0. 0. 0.	.046 .000 .126 .000	Predators Predators Predators Predators Predators Predators Predators
Codonata-Zygopters	Gomphidae Cordulegastridae Cordulidae Libeliuldae Libeliuldae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae Coenagrionidae Lestidae Ceratocogonidae	Argia			5 3.7 6.1 5.1 9 9	0. 0. 0. 0.	.046 .000 .126 .000 .000	Predators Predators Predators Predators Predators Predators Predators Predators Gathers
Odonata-Zygoptera Diptera	Gomphidae Cordulagatridae Cordulidae Libelituldae Calopterygidae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae Coenagrionidae Lestidae Ceratocogonidae Blood-end Chironomidae	Argia		2	5 3.7 8.1 5.1 9 9 5.7 8.1	0. 0. 0. 0. 0.	.046 .000 .126 .000 .000 .000	Predators Predators Predators Predators Predators Predators Predators Predators Gathers Gathers
Odonata-Zygoptera Ciptera	Gomphidae Cordulagastridae Cordulidae Libefluidae Libefluidae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae Coenagrionidae Lestidae Lestidae Ceratoogonidae Blood-rad Chironomidae Other Chironomidae	Argia			5 3.7 6.1 5.1 9 9 5.7 8.1 6	0. 0. 0. 0. 0. 0.	.046 .000 .126 .000 .000 .000 .000	Predators Predators Predators Predators Predators Predators Predators Gathers Gathers Gathers
Odonata-Zygoptera Ciptera	Gomphidae Cordulidae Cordulidae Libellulidae Libellulidae Calopterygidae Colopterygidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Lestidae Cerritoogonidae Blood-nd Chironomidae Other Chironomidae Other Chironomidae Cuididae	Argia		2	5 3.7 6.1 5.1 9 9 5.7 8.1 6	0. 0. 0. 0. 0. 0. 0. 0.	.046 .000 .126 .000 .000 .000 .000 .222 .000	Predators Predators Predators Predators Predators Predators Predators Predators Gathers Gathers Gathers Shredders
Odonata-Zygoptera Ciptera Diptera	Gomphidae Cordulegastridae Cordulidae Libefluidae Libefluidae Calopterygidae Calopterygidae Consagrionidae Consagrionidae Consagrionidae Consagrionidae Consagrionidae Consagrionidae Consagrionidae Consagrionidae Lestidae Cerratopopridae Blood-rad Chronomidae Other Chronomidae Culicidae Simuliidae Simuliidae	Argia		3	5 3.7 6.1 5.1 9 9 5.7 8.1 6	0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	.046 .000 .126 .000 .000 .000 .000 .000 .000	Predators Predators Predators Predators Predators Predators Predators Predators Gathers Gathers Gathers Shredders Filters
Odonata-Zygoptera Ciptera Diptera	Gomphidae Cordulidae Cordulidae Libellulidae Libellulidae Calopterygidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Ceratopogonidae Ceratopogonidae Ceratopogonidae Ceratopogonidae Cibellulidae Other Chironomidae Culididae Simulidae	Argia		2	5 3.7 6.1 9 9 5.7 8.1 6 8	0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	.046 .000 .126 .000 .000 .000 .000 .222 .000 .000 .0	Predators Predators Predators Predators Predators Predators Predators Gathers Gathers Gathers Shredders Filters Predators
9	Gomphidae Cordulegastridae Cordulidae Libefluidae Libefluidae Calopterygidae Calopterygidae Consagrionidae Consagrionidae Consagrionidae Consagrionidae Consagrionidae Consagrionidae Consagrionidae Consagrionidae Lestidae Cerratopopridae Blood-rad Chronomidae Other Chronomidae Culicidae Simuliidae Simuliidae	Argia		3	5 3.7 6.1 5.1 9 9 5.7 8.1 6	0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0	.046 .000 .126 .000 .000 .000 .000 .000 .000 .000 .0	Predators Predators Predators Predators Predators Predators Predators Predators Gathers Gathers Gathers Shredders Filters

TAXA RICHNESS	23
FBI	3.906
Scraper/Filter	4.000
EPT/Chironomidae	9.667
% Contribution of Dominant Taxa	0.200
EPT Index	8.000
Community Similarity Indices	0.000
	4 000

Comm. Loss = 0 Jaccard Coef. = 1

CPOM Total Number Collected 1.000 0.030 100

total shredders

									page		_of	
	ME Lost	Rìve					LOCATION	Fishers Ford	Bridge	3		
STATION #	<u>ч</u>		RIV	ERMII	.E		STREAM CL	ASS	-		·	
LAT	·		LON	G			RIVER BASI	N				
STORET#	· -					_	AGENCY	· · · · · · · · · · · · · · · · · · ·				
COLLECTED	BY E II II	S	ζĹ	DA1	r <u>e</u> ዋ/•	8/04	LOT#	· · · · · · · · · · · · · · · · · · ·				
TAXONOMIS	T 466			DA1	MB	/3/05	SUBSAMPLE	ETARGET 6 100 🗅	200 🗅 :	300 🗆	Other	
	•	.										
		Lute		1		1	d Species name		1	T	1	T
	rganisms		No.	LS	TI	TCR		rganisms I	No.	LS	TI	TCR
Oligochaeta	*		<u> </u>	ļ	ŀ	1	Megaloptera		╄			<u> </u>
	<u></u>			<u> </u>	<u> </u>	<u> </u>			<u> </u>			
Hirudinea	1	<u> </u>	15	A	u	1	Colcoptera	- 1 14 H 1/4 11	ો 18⊲	I	WIL.	1
			Ĺ				١	THU ALLANIE	الجدا مجال	THUFF	1 M	1/ IX
Isopoda	1411	(D)	X	A	466		Longtoe	WI MAN UT H	114/2	A	wil	
								HIZO PRONIE	188	Æ	4il	,
Amphipoda	11 (11)	<u>(2)</u>	70	A	wil		Diptera	1170 149217	(3)	<u>,</u>	0.62	 '
	<u> </u>	<u> </u>	<u> </u>		1	 				· — ·	 	-
Decapoda	W W III	<u>a</u>	- -	Α	7,		•		+		 	-
Decapoda	me hat hi	<u> </u>	13	/4	با ذال				+		├	
Ephemeroptera	M 1704 1	<u></u>	D	T.	we	1			-			
	WWW		Mil	11 1	1		Then				<u> </u>	<u> </u>
Bate	The Tith	الكلا	FO	1 4	شاركينا	1	Gastropoda	· mm H/ M/	MIM W	M	MI	WU
			(JAN JA	t still s A	wic	1
							Techhan	-H . O	2	A	466	1
	<u> </u>						Pelecypoda					
Plecoptera	141	(J)	3	I	WEL	1	Asian Chn	-11	Æ	Α	w6Z	1
		•							a			
							Other Coercand	n-411,417 11	12	1	WGL	一
								770	-30			ا
		ନ୍ତି		Ì			Calipterbid	E-111/141-111		I	wit.	,
Trichoptera	MALLINA.	ואנ וואל	SR.	I	wնL	1	Yellow Knee Donsetty			<u>v</u>	va	1
Hydro	unn	(2)	20	I	سهد	,	pknok	- אוואואואופ		A		┝┯
whener -	LUM	\aleph	*		 	'	1	- [Maritania	1 0	-	106L	┝
MANNE .		$-\omega$		Ī	1166		417.11.11	11 () ()	10	-	 	
							Odensts .	11 Caroniis	10	F	WEL	
						H		Aeshoidae	\	I	W6 L	1
WALES CITY						\square	·		ļ		 	ļ <i>•</i>
Hemiptera Strike		<u>ි</u> ම	<u></u>	R.	LIGE	ш		······································	<u> </u>		<u> </u>	ļ
as assite and	111	0	18	^	անև	<u>'</u>					 	Щ
	inni meta conc	B) 1 C		<u> </u>	<u> </u>		:_ T#:_#_		<u> </u>	205-5	<u> </u>	<u> </u>
axonomic certa = immature; P :	mty rating (TC. = pupa; A = adi	r.j 1-5:1: 1lt TI = '	-m ost Taxon	certair omists	n, o=les initials	ast certi S	un. 11 rating is 3-	5, give reason (e.g., n	ussing g	nus). I	LS= lif	e stage
			sıns					Total No. Taxa		19		

Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Reriphyton, Benthic Macroinvertebrates, and Fish, Second Edition - Form 3

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME 4	951	र	Ç.ve	? T			LOC	ATI	ON	Fis	Lec	51	(or	9 6	Bridge 500N	120	∞	E		
STATION# <u> </u>	R	IVE	RM:	LE			STR	EAN	1 CL	ASS										
LAT	L	ONC	3_				RIVI	ER B	BASII	4										
STORET#							AGE	NC	Ϋ́								-			
INVESTIGATORS	٤	25	3.	ω	6C		LOT NUMBER													
FORM COMPLETED		•	64				DAT					€M		REA.	SON FOR SURVEY			•		_
HABITAT TYPES		Cot	ble	2	%	itage of Ø Sn ophytes	ags 2	. %	6	⁄pe p ØlV	eget	ated	Ban Other		0_% Ø Sand <u>≯o</u>)	_%				
SAMPLE COLLECTION	H	ow v	were	the	sam; umbe	ples col er of jal Sn ophytes	lected	? ks ta	Ø√ ken i	vadin In esc	g :h h:	□ tbita	from	m ba						
GENERAL COMMENTS QUALITATIVE L Indicate estimated										i, 1	- R	аге,	2 =	- Co	nimon, 3= Abunda	nt, 4		Dom	nina:	nt.
·															-					
Periphyton					. 0	~ 7	_				Sli	-				0		_	3	
Filamentous Algae					_	1 0		-							rates	0	1	2	3	4
Macrophytes					0	_1_G) 3	4			Fis	<u>1</u>			ng Sucker	0	_1_	<u> </u>	3	4
FIELD OBSERVA Indicate estimated					0 -	Absen	t/Not	Obs	serve inda	e d, 1	(–)	Rar	e (1·	-3 oı	ganisms), 2 = Com , 4 = Dominant (>5	mon 0 or	(3- gan	9 isms	s)	
Porifera	0	1	2	3	4	Anis	optera	1		0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygo	-			0	1	2	3	4	Ephemeroptera			2		
Platyhelminthes	0	1	2	3	4	Hem	iptera							4		0	1	2	3	4
Turbellaria		1	2	3	4	Cole	optera	ı						4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepid	lopter	a		0	1	2	3	4	· ·					
Oligochaeta	n	1	7	3	4	Sializ	lae			Λ	1	2	1	1	l .					

Corydalidae

2 3

3

3

2 3

Tipulidae

Empididae

Simuliidae

Tabinidae

Culcidae

Isopoda

Amphipoda

Gastropoda

Decapoda

Bivalvia

1 .2 3

2 3 4

2

2 3

1

3 4

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

<u></u>	· •					
STREAM NAME Lost		LOCATION	Fishers	Ford B	ridge	SOON + 200F
	IVERMILE	STREAM CL	ASS			
	ONG	RIVER BASIN	1		······································	<u> </u>
STORET#		AGENCY				
INVESTIGATORS	E 28, WIL	·				
FORM COMPLETED BY		DATE 9/8/ TIME 1800	AM	REASON FO	OR SURVEY	
WEATHER CONDITIONS	Now Storm	ı (heavy rain) (Steady rain)	Past 24 hours	Has there been □ Yes ØN Air Temperate		in the last 7 days?
	Shower	s (intermittent) loud cover ear/sunny	, , , ,	Other		
SITE LOCATION/MAP	Draw a map of the s	te and indicate t	he grees com	alad (ov attack		
				bren (o. stracti	a pnotograph)	
			,			
	* '			<u> </u>		• .
	ç.				• .	
		-				
CTHEAM				- 	· 	a .
	Stream Subsystem Perennial Inte Stream Origin Glacial Non-glacial montane Swamp and bog	Spring-fed	· (tream Type I Coldwater J Catchment Area		n¹

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHI

LOST River Station 4 9/1/0

			·	
WATERSHED FEATURES	Predominant Surrounding Lan	rcial al	Local Watershed NPS Pollution No evidence Some potential so. Obvious sources Local Watershed Erosion None Moderate Heavy	14
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and O Trees OSh dominant species present Re	record the domin	gant species present Grasses	4
INSTREAM FEATURES	Estimated Reach Length 12 Estimated Stream Width 12 Sampling Reach Area Area in km² (m²x1000) Estimated Stream Depth 15 Surface Velocitym (at the lweg)	m m¹ km² m	Canopy Cover Partly open Partly shaded High Water Mark Proportion of Reach Represented b Morphology Types Riffle	
LARGE WOODY DEBRIS	LWDm² Density of LWDm	³/km² (LWD/ reac	b area)	
AQUATIC VEGETATION	li .	oted submergent tached Algae	☐ Rooted floating ☐ Free	:g
WATER QUALITY	Temperature 71.5° ¢ F Specific Conductance 455 Dissolved Oxygen 8.33 pH 7.97 Turbidity 2.4 WQ Instrument Used PRF= 387		Water Odors Normal/None	
SEDIMENT/ SUBSTRATE	Odors Normal Sewage Chemical Anaerobic Other Oils Absent Slight Moderal		Deposits O Sludge O Sawdust O Paper O Relict shells O Other Looking at stones which are not dembedded, are the undersides blac O Yes 20 No	□ Sand
	STRATE COMPONENTS add up to 190%)	OR	GANIC SUBSTRATE COMPONES does not necessarily add up to 100%	

INO	RGANIC SUBSTRATE (should add up to 1		ORGANIC SUBSTRATE COMPONE? (does not necessarily add up to 100%				
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type			tion in Area	
Bedrock			Detritus	sticks, wood, coarse plant		 	
Boulder	> 256 mm (10")		1	materials (CPOM)			
Cobble	64-256 mm (2.5"-10")"		Muck-Mud	black, very fine organic	'- <u>-</u> -	-,	
Gravel	2-64 mm (0.1"-2.5")]	(FPOM)			
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	 -	_	
Silt	0.004-0.06 mm		1				
Clay	< 0.004 mm (slick)		1				

A-6

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Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 60.5

River Code:	RM:	Stream:	Lost River			
Date: 9/8/04		Site 4		Find. Bi	ridae	
Scorers Full Name: 9	- 0, -	Affiliation:		-		
1] SUBSTRATE (Check	ONLY Two Substrat	eTYPE BOXES	; Estimate % presen	ıt		
TYPE POOL	RIFFLE	POOL RIFF	LE SUBSTRATE OR	<u>GIN</u>	SUBSTRATE QUALITY	
1 D-BLDR /SLBS[10]	GRAVEL	.[7]	_Check ONE (OR 2 & A	(VERAGE)	Check ONE (OR 2 & AVERAGE	Ē)
DD-BOULDER [9]	G CI-SAND [6])	_ 🗖 -LIMESTONE [1] SILT:	D-SILT HEAVY [-2]	
ELE-COBBLE [8]	@ BBEDROO		TILLS [1]		SILT MODERATE [-1]	Substrate
O D-HARDPAN [4]	DEDETRITU		_ D -WETLANDS[0]		SILT NORMAL [0]	
D-MUCK [2]	EID-ARTIFICI		_ EI -HARDPAN [0]	OLEMBEDI	O-SILT FREE [1]	[12]
MERSICI [2]	NOTE: Ignore Si From Point Sour	ces	SANDSTONE [FIP/RAP [0]	uj embebl NESS:	DED -EXTENSIVE [-2] -MODERATE [-1]	Max 20
NUMBER OF SUBSTRATE T	YPES: 54 or Mo	re (2)	- LACUSTRINE [0]		-MORMAL [0]	
(High Quality Only, Score 5	or >) D-3 or Les		G-SHALE [-1]	•	-NONE [1]	
COMMENTS			D-COAL FINES [-2	1		
2] INSTREAM COVER (o 3; see back for inst		AMOUNT: (Check ONLY One	or o
(Structure)		ore All That Occu	r [.]		check 2 and AVERAGE)	Cover
UNDERCUT BANKS [1]		0LS> 70 cm [2]	OXBOWS, BACK		☐ - EXTENSIVE > 75% [11]	15
XOVERHANGING VEGETAT		OTWADS [1]	<u> </u>		₩- MODERATE 25-75% [7]	<u>([13]</u>
SHALLOWS (IN SLOW WA	· · · · · · —	JLDERS [1]	_∠LOGS OR WOOD	Y DEBRIS [1]	D - SPARSE 5-25% [3]	Max 20
VROOTMATS [1] COM		V One PER C-	togoni OD ab == (c C =		- NEARLY ABSENT < 5%[1]	
3] CHANNEL MORPHOL SINUOSITY DEVI		Y ONE PER CA NNELIZATION	tegory OR check 2 a STABILITY		FIE) Tions/other	Channel
		NONE [6]	<u>31,25151 1</u> □ - HIGH [3]	- SNAG		
2	7.7	RECOVERED [4]			_	$\parallel \mu \parallel$
		RECOVERING [3		-	PY REMOVAL. II - LEVEED	Max 20
@ - NONE [1]	900R[1] III-	RECENT OR NO		☐ - DRED	GING 🔲 - BANK SHAPING	MOX EO
	REC	OVERY [1]		ONE S	SIDE CHANNEL MODIFICATIONS	
COMMENTS:		<u></u>				
4]. RIPARIAN ZONE AND						Downstream i
RIPARIAN WIDTH L R (Per Bank)			<u>JALITY (PAST 100 Me</u> ik) L R	ter KIPARIA		Riparian
□	L R (Most Predo		IK) L K	STION: TIEL AC	L R (Per Bank) SE [1] □ □-NONE/LITTLE [3]	
MODERATE 10-50m [3			U-URBAN C			4.5
NARROW 5-10 m [2]	- PRESIDENTIAL					Max 10
DD - VERY NARROW <5 m[□ □ MINING/			•
□C - NONE [0]						
COMMENTS:						
EIDOOL/OLIDE AND EIT						
5.]POOL/GLIDE AND RIF			CURR	CLIT UCI AAN	TV - DOOLO & OUTC: TO::	Pool/
MAX. DEPTH (Check 1 ONLYI)	MORPHOLO (Check 1 or 2 8		CUKK		TY [POOLS & RIFFLES!] I That Apply)	Current
•	POOL WIDTH > RI		🖸 -EDDIES[1	•	i i nat Apply) I -TORRENTIAL[-1]	
	D -POOL WIDTH - RIF		□ FAST[1]	*	I-INTERSTITIAL[-1]	<u>ر م</u>
-	-POOL WIDTH < RIF		-MODERAT	E[1] E	3-INTERMITTENT[-2]	Max 12
■ - 0.2- 0.4m [1]		-	pr -slow [1]		-VERY FAST[1]	
□ - < 0.2m [POOL=0]	COMMENTS:					
	_	AUE 01/ 01/5				Riffle/Run
DIEELE DEDTU	DIM DEDTU		OR CHECK 2 AND A			
RIFFLE DEPTH Best Areas >10 cm [2]	RUN DEPTH - MAX > 5		FFLE/RUN SUBSTRAT		RIFFLE/RUN EMBEDDEDNESS	4
- Best Areas 5-10 cm [2]			BLE (e.g.,Cobble, Bo D. STABLE (e.g.,Larg			Max 8
☐ - Best Areas < 5 cm	Ja - 10007 < 3		STABLE (Fine Gravel,		MODERATE [0]	Gradient
[RIFFLE=0]			and trute district	inauro, [o]	□ - EXTENSIVE [-1]	CIACIBIL
COMMENTS:		· · · · · · · · · · · · · · · · · · ·	a.	NO RIFFLE		6
 					<u> </u>	Max 10
6] GRADIENT (ft/mi): _	DRAINAGE	AREA (sq.mi.) :		<u> </u>	95 %GLIDE:	HIGA IV
** Beet areas neest be large enough to supp	ort e population of riffle-obligate	species	%R	IFFLE:	%RUN: /D	
	F					

06/24/01

		#	

	ORDER	FAMILY	GENUS	SPECIES	COUNT	TOLERANCE VALUES		
1	Vernatomorpha						0.000	Parasite
3	Hydracarina- Trombidiformes Lubellaria	Planaria			5	4	0.000	Predators/Parasi Omnivore
	Porifera	Spongilidae			9	•	0.267	Filters
E	Pelecypoda	Unionidae	Villosa	iris			0.000	
5		Corbiculidae	Corbicula	fluminea		3.2	0.000	Filters
ŀ		Sphaeriidae	Destaura			8	0.000	Filters
1	Gastropoda	Dreissenidae Ancylidae	Dreissena	polymorpha		6	0.000	Scrapers
ľ		Lymnaeidae				6.9	0.000	Scrapers
		Lymnaeidae	Fossaria			2.6	0.000	Scrapers
6		Physidae				8	0.000	Scrapers
19		Physidae	Physella		1	8	0.000	Scrapers
"		Planorbidae Planorbidae	Planorbula		1	7	0.093	Scrapers Scrapers
7		Pleuroceridae			24	,		Scrapers
-		Bithyniidae	Bithynia	tentaculata			0.000	Scrapers
11	Annelida	Oligochaeta				40	0.000	Gathers
	Decapoda	Hirudinea			3	10	0.133	Gathers Predators
20 7	Amphipoda				2	4	0.107	Shredders
2	sopoda	Asellidae			2	8	0.213	Shredders
	Ostracoda Ephemeroptera	Caenidae				8	0.000	Scavengers
ľ	приниторина приниторина	Caenidae	Caenis			3.1	0.000	Gathers Gathers
		Ephemeridae	Hexagenia			3.6	0.000	Gathers
1		Baetidae				4	0.000	Gathers
1		Baetidae	Baetis		4	3.1	0.165	Gathers
1		Baetidae Baetidae	Baetis Baetis	brunneicolor		4 27	0.000	Gathers
1		Baetidae	Baetis Callibaetis	intercalaris		2.7 5.6		Gathers Gathers
11		Heptageniidae	Stenacron			3.1	0.000	Scrapers
[Heptageniidae	Stenacron	gildersleevei		3.1	0.000	Scrapers
9		Heptageniidae	Stenonema	and as your	7	4	0.373	Scrapers
1		Heptageniidae Siphlonuridae	Stenonema	exiguum		7.9	0.000	Scrapers Gathers
1		Ephemerellidae	Timpanoga			1		Gathers
I		Leptophlebildae				2	0.000	Gathers
0		Leptohyphidae	Tricorythodes			2.7	0.000	Gathers
	Coleoptera	Isonychiidae Dytiscidae	Isonychia	-		5	0.000	Filters
ľ	Octopiera	Gyrinidae				5	0.000	Predators Predators
1		Gyrinidae	Dineutus			3.7		Predators
2		Haliplidae				7	0.000	Predators
4		Dryopidae			40	5	0.000	Predators
2		Elmidae Psephenidae	Psephenus		12	4	0.640	Gathers Scrapers
ī		Hydrophiloidae	r suprierius		10	-	0.000	Gathers
[Hydrophiloidae	Tropisternus				0.000	Calhara
14	Megaloptera	Corydalidae	Corydalus			4	0.000	Predators
"		Corydalidae Sialidae	Nigronia			4	0.000	Predators Predators
t	Trichoptera	Brachycentridae	Brachycentrus			1	0.000	Filters
17		Helicopsychidae	Helicopsyche		8	3	0.320	Scrapers
		Helicopsychidae	Helicopsyche	borealis		3	0.000	Scrapers
27		Hydropsychidae Hydropsychidae	Hydropsyche	-	2	4	0.107	Filters
t		Hydropsychidae	Hydropsyche	betteni		4	0.000	Filters
-[Hydropsychidae	Hydropsyche	scalaris		4	0.000	Filters
1		Hydropsychidae	Symphitopsyche			4	0.000	Filters
1		Hydroptiidae	Unidentific			4		Gathers
1		Hydroptilidae Leptoceridae	Hydroptila			3.2	0.000	Gathers Shredders
t		Leptoceridae	Nectopsyche			4		Shredders
Ţ		Molannidae				6		Gathers
6		Odontoceridae			1	0	0.000	
3		Philiopotamidae Philiopotamidae	Chimarra			3 4	0.000	
1		Phryganeidae	Hagenella			4	0.000	Shredders
L		Polycentropodidae	Cymellus			6	0.000	Filters
0	Mamintara	Psychomylidae	Lype			2	0.000	Gathers
1	Hemiptera	Belostomatidae Belostomatidae	Belostoma		1		0.000	Predators Predators
I		Corixidae				10	0.000	Predators
5		Gerridae				5	0.000	Predators
ŀ		Gerridae	Trepobates			5	0.000	Predators
1		Nepidae Nepidae	Ranatra	-				Predators
1		Notonectidae	Notonecta				0.000	Predators Predators
4		Veliidae	Rhagovelia					Predators
I	Plecoptera	Chloroperlidae				1	0.000	Predators
1		Perlidae	Periesta			1		Predators
8		Perlidae Perlidae	Neoperla Claassenia		1	1		Predators Predators
	Odonata-Anisoptera	Aeshnidae				3		Predators Predators
I		Aeshnidae	Boyeria			3	0.000	Predators
1		Gomphidae				1	0.000	Predators.
8		Cordulegastridae Cordulidae			1	3	0.000	Predators Predators
1		Libellulidae			1	5	0.067	Predators Predators
I	Odonata-Zygoptera	Calopterygidae				5	0.000	Predators
2		Calopterygidae	Calopteryx		3	3.7	0.148	Predators
0		Coenagrionidae	Araia		-	6.1	0.000	Predators
19		Coenagrionidae Coenagrionidae	Argia Engallagma		7	5.1 9		Predators Predators
1		Lestidae				9	0.000	Predators Predators
-	Diptera	Ceratopogonidae				5.7	0.000	Gathers
	D-\$1010					8.1	0.000	Gathers
15	-	Blood-red Chironomidae				6		
5 6	D- gr con to	Other Chironomidae					0.000	Chrodden
5 6 8		Other Chironomidae Culicidae				8	0.000	Shredders
5 6		Other Chironomidae				8	0.000 0.000 0.000	Shredders Filters Predators Gathers

TAXA RICHNESS	19	
FBI	4.243	
Scraper/Filter	27.500	
EPT/Chironomidae	#DIV/0!	23/0
% Contribution of Dominant Taxa	0.240	
EPT Index	6.000	
Community Similarity Indices	0.000	Comm. Loss = 0
	1.000	Jaccard Coef. = 1
СРОМ	0.040	
Total Number Collected	100	
total shredders	4	

APPENDIX II:

MACROINVERTEBRATE VOUCHER SPECIMENS



visio vertere virtute

April 22, 2005

Dr. Arwin Provonsha
Department of Entomolgy
901 W. State Street
West Lafayette, IN 47907-2089

Re: Invertebrate Voucher Specimens

Lost River, Orange County, Indiana

Dear Dr. Provonsha:

Enclosed you will find thirty-five (35) representative macroinvertebrate specimens, in individually labeled vials, and photo-documentation of each. This voucher collection is being submitted to Purdue University Department of Entomology as part of the Lost River Water Quality Monitoring Study. This project is being done for the Orange County Soil and Water Conservation District and the Indiana Department of Natural Resources through the Lake and River Enhancement (LARE) program. Please verify these specimens for us.

Please contact me at 630-724-9200 ext. 154, if you have any questions or concerns. Thank you very much.

Very truly yours,

V3 Companies of Illinois, Ltd.

Walter Levernier

Ecologist

Edward J Belmonte

Senior Ecologist/Project Manager

WGL/ss

Attachments

cc: Frank Hodges, IDNR

Cecil Rich, IDNR

V3 File

CHICAGO • DENVER • PHOENIX



Department of Entomology

27 Apr 2005

Walter Levernier V3 Companiès of Illinois Ltd. 7325 Janes Avenue Woodridge, IL 60517

Dear Dr. Levernier,

Thank you for depositing in PERC voucher specimen from the Lost River Water Quality Monitoring Study. The specimens arrived in good condition. I have examined them, and within my own level of expertise, find all of the identifications to be accurate.

We appreciate the deposition of materials here, and look forward to continued cooperation in the future.

Sincerely,

Arwin Provonsha Curator of Collections



Lost River Water Quality Monitoring Study Photo 1 Vial No. 1

1/3/05

Family: Aeshnidae

Stations 1,2,3,4



Lost River Water Quality Monitoring Study Photo 2 Vial 2

1/3/05

Calopterygidae Calopteryx sp.

Stations 1,2,3,4

Lost River Water Quality Monitoring Study Photo 3 Vial 3

1/3/05

Order: Decapoda

Stations 1,2,3,4



Lost River Water Quality Monitoring Study Photo 4 Vial 4

1/3/05

Veliidae Rhagovelia sp.

Station 1

Lost River Water Quality Monitoring Study Photo 5 Vial 5

1/3/05

Family: Gerridae

Station 1,2,3,4

Lost River Water Quality Monitoring Study Photo 6 Vial 6

1/3/05

Family: Physidae

Stations 1,2



Lost River Water Quality Monitoring Study Photo 7 Vial 7

1/3/05

Family: Pleuroceridae

Stations 1,2,3,4



Lost River Water Quality Monitoring Study Photo 8 Vial 8

1/3/05

Perlidae Claassenia sp.

Stations 1,2,3,4

Lost River Water Quality Monitoring Study Photo 9 Vial 9

1/3/05

Heptageniidae Stenonama sp.

Stations 1,2,3,4



Lost River Water Quality Monitoring Study Photo 10 Vial 10

1/3/05

Isonychiidae Isonychia sp.

Stations 1,3

Lost River Water Quality Monitoring Study Photo 11 Vial 11

2/24/05

Family: Beatidae

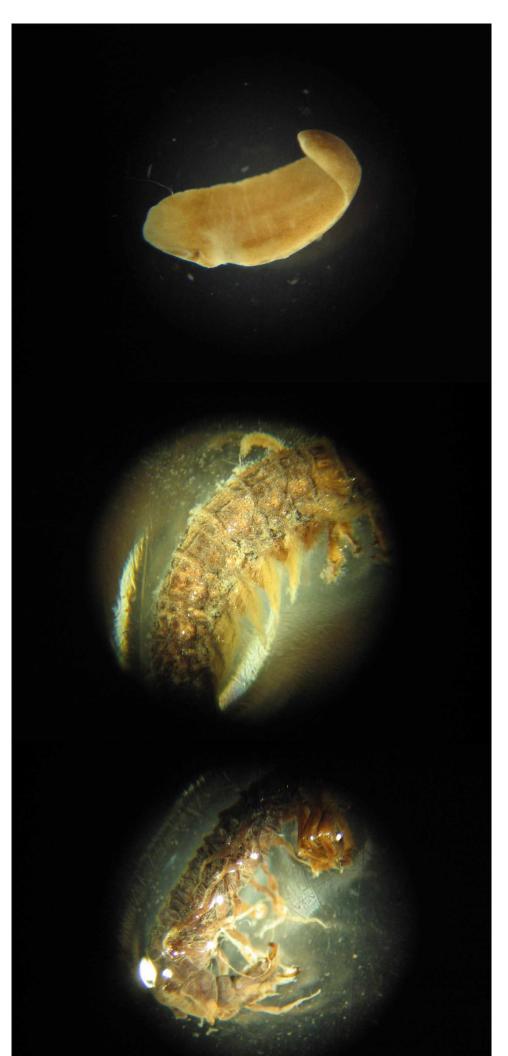
Stations 1,2,3,4

Lost River Water Quality Monitoring Study Photo 12 Vial 12

1/3/05

Psephenidae Psephenus sp.

Stations 1,2,3,4



Lost River Water Quality Monitoring Study Photo 13 Vial 13

1/3/05

Class: Turbellaria

Stations 1,2,3,4

Lost River Water Quality Monitoring Study Photo 14 Vial 14

1/3/05

Corydalidae Corydalus sp.

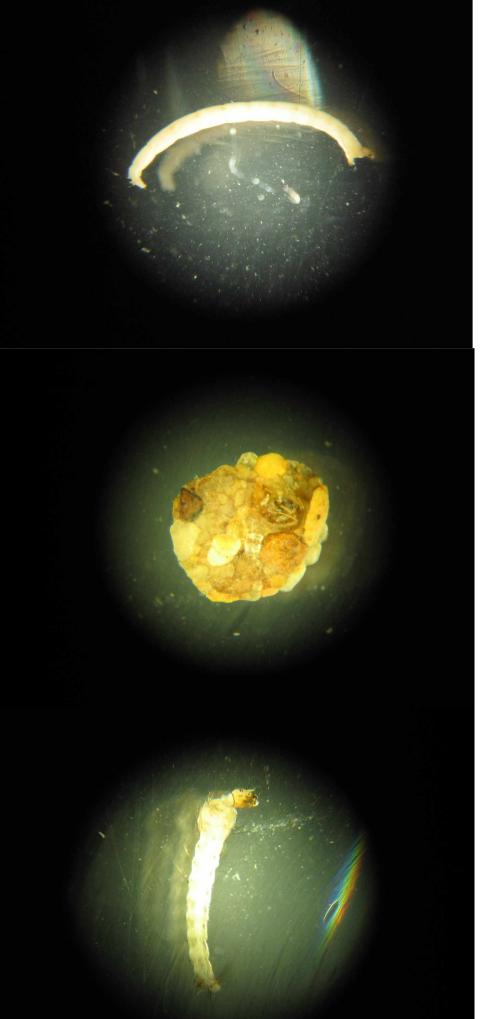
Stations 1,3

Lost River Water Quality Monitoring Study Vial 15 Photo 15

1/3/05

Corydalidae Nigronia sp.

Stations 1,2,3



Lost River Water Quality Monitoring Study Vial 16 Photo 16

1/3/05

Family: Chironomidae

Stations 1,2,3

Lost River Water Quality Monitoring Study Vial 17 Photo 17

1/3/05

Helicopsychidae Helicopsyche sp.

Stations 1,3,4

Lost River Water Quality Monitoring Study Vial 18 Photo 18

1/3/05

Family: Culicidae

Stations 1,2



Lost River Water Quality Monitoring Study Photo 19 Vial 19

1/3/05

Coenagrionidae Argia sp.

Stations 2,3,4

Lost River Water Quality Monitoring Study Photo 20 Vial 20

1/3/05

Order: Amphipoda

Stations 2,3,4

Lost River Water Quality Monitoring Study Photo 21 Vial 21

1/18/05

Heptageniidae Stenacron sp.

Stations 2,3



Lost River Water Quality Monitoring Study Photo 22 Vial 22

1/18/05

Family: *Halipiidae*

Station 2

Lost River Water Quality Monitoring Study Photo 23 Vial 23

1/18/05

Family: *Elmidae*

Stations 2,3,4

Lost River Water Quality Monitoring Study Photo 24 Vial 24

1/18/05

Family: *Elmidae*

Stations 2,3,4



Lost River Water Quality Monitoring Study Photo 25 Vial 25

1/18/05

Corbiculidae Corbicula fluminea

Stations 3,4



Lost River Water Quality Monitoring Study Photo 26 Vial 26

1/18/05

Family: Odontoceridae

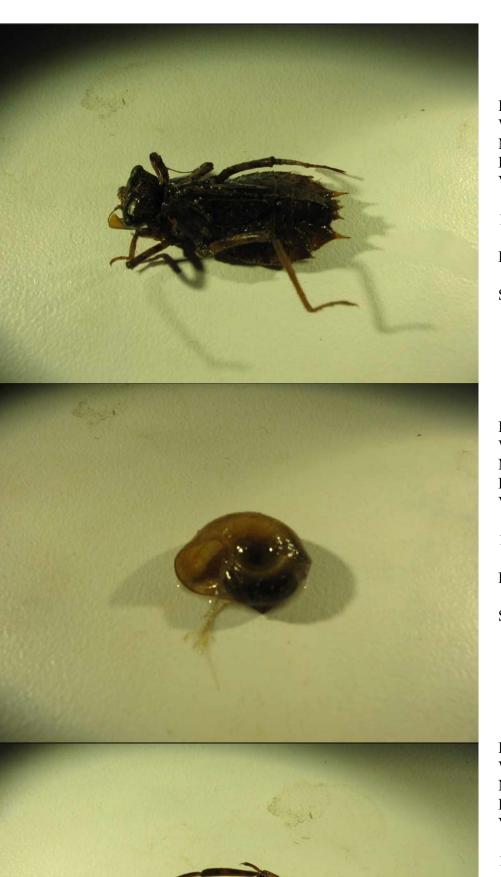
Station 4

Lost River Water Quality Monitoring Study Photo 27 Vial 27

1/18/05

Family: *Hydropsychidae*

Stations 1,2,3,4



Lost River Water Quality Monitoring Study Photo 28 Vial 28

1/18/05

Family: Corduliidae

Station 4

Lost River Water Quality Monitoring Study Photo 29 Vial 29

1/18/05

Family: Planorbidae

Station 4

Lost River Water Quality Monitoring Study Photo 30 Vial 30

1/18/05

Family: Belostomatidae

Station 4



Lost River Water Quality Monitoring Study Photo 31 Vial 31

1/18/05

Class: *Hirudinea*

Station 4

Lost River Water Quality Monitoring Study Photo 32 Vial 32

1/18/05

Family: Asellidae

Station 4

Lost River Water Quality Monitoring Study Photo 33 Vial 33

2/24/05

Philopotamidae Chimarra sp.

Stations 1,2,3



Lost River Water Quality Monitoring Study Photo 34 Vial 34

2/24/05

Family: Tipulidae

Stations 2,3

Lost River Water Quality Monitoring Study Photo 35 Vial 35

2/24/05

Family: "Red" *Chironomidae*

Stations 1,2

APPENDIX III:

STATION PHOTOGRAPHS



September 9, 2004

South Fork Lost River (Station 1) near County Road 350N facing upstream.

Macroinvertebrate sampling.



PHOTO 2

September 9, 2004

South Fork Lost River (Station 1) near County Road 350N facing downstream.

Macroinvertebrate sampling.



PHOTO 3

January 6, 2005

South Fork Lost River (Station 1) near County Road 350N facing upstream. Stormflow sampling.



January 6, 2005

South Fork Lost River (Station 1) near County Road 350N facing downstream. Stormflow sampling.



PHOTO 5

September 9, 2004

Carter Creek (Station 2) near Tater Road facing upstream. Macroinvertebrate sampling.



PHOTO 6

September 9, 2004

Carter Creek (Station 2) near Tater Road facing downstream. Macroinvertebrate sampling.



January 6, 2005

Carter Creek (Station 2) near Tater Road facing upstream. Stormflow sampling.



PHOTO 8

January 6, 2005

Carter Creek (Station 2) near Tater Road facing downstream. Stormflow sampling.



PHOTO 9

September 9, 2004

Lost River (Station 3) at Tater Road facing upstream. Macroinvertebrate sampling.



September 9, 2004

Lost River (Station 3) at Tater Road facing downstream. Macroinvertebrate sampling.



PHOTO 11

January 6, 2005

Lost River (Station 3) at Tater Road facing upstream. Stormflow sampling.



PHOTO 12

January 6, 2005

Lost River (Station 3) at Tater Road facing downstream. Stormflow sampling.



September 9, 2004

Lost River (Station 4) at Fishers Ford Bridge upstream view. Macroinverterate sampling



PHOTO 14

September 9, 2004

Lost River (Station 4) at Fishers Ford Bridge downstream view. Macroinvertebrate sampling.



PHOTO 15

January 6, 2005

Lost River (Station 4) at Fishers Ford Bridge upstream view. Stormflow sampling.



January 6, 2005

Lost River (Station 4) at Fishers Ford Bridge downstream view. Stormflow sampling.



PHOTO 17

October 14, 2003

Lost River (Station 5) at County Road 100W upstream view of drybed.



PHOTO 18

January 5, 2005

Lost River (Station 5) at County Road 100W during stormflow sampling.



June 30, 2004

Lost River (Station 6) in Tolliver Swallow Hole during baseflow sampling.



PHOTO 20

June 29, 2004

Lost River (Station 7) at Wesley Chapel Gulf during baseflow sampling.



PHOTO 21

January 5, 2005

Lost River (Station 7) at Wesley Chapel Gulf during stormflow sampling.



January 5, 2005

Lost River (Station 8) at Roosevelt Road upstream view. Stormflow samling.



PHOTO 23

January 5, 2005

Lost River (Station 8) at Roosevelt Road downstream view. Stormflow sampling.



PHOTO 24

June 29, 2005

Lost River (Station 9) at True Rise during baseflow sampling.



January 5, 2005

Lost River (Station 9) near True Rise during stormflow sampling.



PHOTO 26

January 5, 2005

Lost River (Station 10) Orangeville Road upstream view. Stormflow sampling.



PHOTO 27

January 5, 2005

Lost River (Station 10) Orangeville Road downstream view. Stormflow sampling.

APPENDIX IV:

LABORATORY REPORTS



LABORATORY REPORT

V-3 Consultants 7325 Janes Avenue Woodridge, IL 40517

Attn: Mr. Ed Belmonte

Date Received: 01/05/2005 Report Date: 01/17/2005

Client Number: 002076 Order No: 2005010052

P.O. No .:

Project:

Released By

ANALYTICAL RESULTS Order No: 2005010052

COC No: 41169

Page 1

SAMPLE INFORMATION

SAMPLE NO: 1 Collection Date: 01/05/2005

Time: 08:30: Sample Location:

Site 5 Dry Bed 100 W

Collected By: Client

Sample Matrix: Surface Water

Sample Type: Grab

Special Instructions:

			DETECTIO	N	DATE		QC
PARAMETER	RESULT	UNITS	LIMIT	ANALYST	ANALYZED	METHOD	ID NO
Escherichia Coliform	4800	/100mL	100	CMB	01/05/2005	EPA 1103.1	602437
		ME	TALS				
PARAMETER	RESULT	UNITS	DETECTION LIMIT	N ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.281	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.467	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
		WET CH	HEMISTRY				
PARAMETER	RESULT	UNITS	DETECTION LIMIT	ON ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.234	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	2.88	mg/L	0.010	JHW	01/05/2005	SM4500-NO3	108817
Nitrogen, nitrite	0.015	mg/L	0.010	JHW	01/05/2005	SM4500-NO2	108801



Order No: 2005010052 COC No: 41169

SAMPLE INFORMATION

SAMPLE NO: 2 Collection Date: 01/05/2005

Time: 09:30: Sample Location:

Site 7 Wesley Chapel Gulf

Collected By: Client

Sample Matrix:

Surface Water

Sample Type: Grab

Special Instructions:

RAC	TER	IOI	OGY
DAC	ILI	IOL	001

PARAMETER	RESULT	UNITS	LIMIT		ANALYZED	METHOD	ID NO
Escherichia Coliform	2000	/100mL	100	CMB	01/05/2005	EPA 1103.1	602437
		ME	TALS				
PARAMETER	RESULT	UNITS	DETECTION LIMIT		DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.171	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.289	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
		WET C	HEMISTRY				
PARAMETER	RESULT	UNITS	DETECTION LIMIT		DATE ANALYZED	METHOD	QC ID NO

mg/L

mg/L

mg/L

SAMPLE INFORMATION

0.01

0.010

0.010

JHW

JHW

JHW

SAMPLE NO: 3 Collection Date: 01/05/2005

0.177

4.41

0.014

Time: 12:00: Sample Location:

Site 8 Dry Bed Roosevelt

EPA 350.3

SM4500-NO3

SM4500-NO2

108810

108817

108801

Collected By: Client

Sample Matrix: Surface Water

DETECTION

Sample Type: Grab

01/06/2005

01/05/2005

01/05/2005

Special Instructions:

Ammonia nitrogen

Nitrogen, nitrate

Nitrogen, nitrite

PARAMETER	RESULT	UNITS	LIMIT		ANALYZED	METHOD	ID NO
Escherichia Coliform	5000	/100mL	100	CMB	01/05/2005	EPA 1103.1	602437
		ME	ETALS				
PARAMETER	RESULT	UNITS	DETECTION LIMIT		DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.311	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.537	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499

Order No: 2005010052 COC No: 41169

SAMPLE INFORMATION

SAMPLE NO: 3 Collection Date: 01/05/2005

Time: 12:00: Sample Location:

Site 8 Dry Bed Roosevelt

Collected By: Client

Sample Matrix: Surface Water

Sample Type: Grab

Special Instructions:

WET CHEMISTRY

			DETECTIO		DATE	METHOD	QC
PARAMETER	RESULT	UNITS	LIMIT	ANALYST	ANALYZED	METHOD	ID NO
Ammonia nitrogen	0.201	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	2.05	mg/L	0.010	JHW	01/05/2005	SM4500-NO3	108817
Nitrogen, nitrite	0.015	mg/L	0.010	JHW	01/05/2005	SM4500-NO2	108801

SAMPLE INFORMATION

SAMPLE NO: 4 Collection Date: 01/05/2005

Time: 10:30: Sample Location:

Site 9 True Rise Lost River

Collected By: Client

Sample Matrix: Surface Water

Sample Type: Grab

Special Instructions:

		D,					
PARAMETER	RESULT	UNITS	DETECTION LIMIT	ON ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	2800	/100mL	10	CMB	01/05/2005	EPA 1103.1	602437
		ME	TALS				
PARAMETER	RESULT	UNITS	DETECTION LIMIT	ON ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.093	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.165	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
		WET CI	HEMISTRY				
PARAMETER	RESULT	UNITS	DETECTION LIMIT	ON ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.057	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	3.03	mg/L	0.010	JHW	01/05/2005	SM4500-NO3	108817
Nitrogen, nitrite	0.011	mg/L	0.010	JHW	01/05/2005	SM4500-NO2	108801

Page 4

Order No: 2005010052 CCC No: 41169

SAMPLE INFORMATION

SAMPLE NO: 5 Collection Date: 01/05/2005

Time: 12:30: Sample Location:

Site 10 Lost River

Collected By: Client

Sample Matrix: Surface Water

Sample Type: Grab

Special Instructions:

		BACTE	RIOLOGY				
PARAMETER	RESULT	UNITS	DETECTION LIMIT	N ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	940	/100mL	10	CMB	01/05/2005	EPA 1103.1	602437
		ME	ETALS			THEFT	
PARAMETER	RESULT	UNITS	DETECTION LIMIT	ON ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.098	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.177	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
		WETC	HEMISTRY				
PARAMETER	RESULT	UNITS	DETECTION LIMIT	ON ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.051	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	3.36	mg/L	0.010	JHW	01/05/2005	SM4500-NO3	108817
Nitrogen, nitrite	0.011	mg/L	0.010	JHW	01/05/2005	SM4500-NO2	108801



LABORATORY REPORT

V-3 Consultants 7325 Janes Avenue Woodridge, IL 40517

Attn: Mr. Ed Belmonte

Date Received: 01/06/2005 Report Date: 01/17/2005

Client Number: 002076 Order No: 2005010069

P.O. No .:

Project:

Released By:

Order No: 2005010069

COC No: 41186

ANALYTICAL RESULTS

Page 1

SAMPLE INFORMATION

SAMPLE NO: 1 Collection Date:01/06/2005 Time:09:45: Sample Location: Site 1 South Fork Lost River

Collected By: Client

Sample Matrix: Storm Water

Sample Type: Grab

Special Instructions:

			DETECTION	DATE		QC
PARAMETER	RESULT	UNITS	LIMIT ANALYST	ANALYZED	METHOD	ID NO
Escherichia Coliform	690 B32	/100mL	10 CMB	01/06/2005 E	PA 1103.1	602438
		MET	ALS			
PARAMETER	RESULT	UNITS	DETECTION LIMIT ANALYS	DATE MALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.206	mg/L	0.010 TLH	01/07/2005 E	PA 200.7	509499
Phosphorus, total	0.270	mg/L	0.010 TLH	01/07/2005 E	PA 200.7	509499
		WET CHI	EMISTRY			
PARAMETER	RESULT	UNITS	DETECTION LIMIT ANALYS	DATE T ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.074	mg/L	0.01 JHW	01/06/2005 E	PA 350.3	108810
Nitrogen nitrate	2.04	mg/L	0.010 JHW	01/06/2005 SM	/4500-NO3	108818

Order No: 2005010069

COC No: 41186

SAMPLE INFORMATION

SAMPLE NO: 2 Collection Date:01/06/2005 Time:09:15: Sample Location: Site 2 Carters Creek

Collected By: Client Sample Matrix: Storm Water Sample Type: Grab

Special Instructions:

BACTERIOLOGY

		1	D	ETECTION	V	DATE		QC
PARAMETER	RESULT		UNITS	LIMIT	ANALYST	ANALYZED	METHOD	ID NO
Escherichia Coliform	1600	B32	/100mL	10	CMB	01/06/2005	EPA 1103.1	602438

METALS

		D	ETECTION	V	DATE		QC
PARAMETER	RESULT	UNITS	LIMIT	ANALYST	ANALYZED	METHOD	ID NO
Phosphorus, dissolved	0.202	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.263	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499

WET CHEMISTRY

		D	ETECTION	V	DATE	QC	
PARAMETER	RESULT	UNITS	LIMIT	ANALYST	ANALYZED	METHOD	ID NO
Ammonia nitrogen	0.074	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	2.05	mg/L	0.010	JHW	01/06/2005	SM4500-NO3	108818
Nitrogen, nitrite	0.011	mg/L	0.010	JHW	01/06/2005	SM4500-NO2	108826

SAMPLE INFORMATION

SAMPLE NO: 3 Collection Date:01/06/2005 Time:08:45: Sample Location: Site 3 Lost River Tater Rd.

Collected By: Client Sample Matrix: Storm Water Sample Type:Grab

Special Instructions:

BACTERIOLOGY

Militaria de la companya del companya del companya de la companya			D	ETECTIO	N	DATE	QC	
PARAMETER	RESULT		UNITS	LIMIT	ANALYST	ANALYZED	METHOD	ID NO
Escherichia Coliform	2400	B32	/100mL	10	CMB	01/06/2005	EPA 1103.1	602438
			MET	ALS				

DETECTION PARAMETER ID NO 0.010 TLH 01/07/2005 EPA 200.7 509499 0.253 mg/L Phosphorus, dissolved 509499 0.010 TLH 01/07/2005 EPA 200.7 0.326 mg/L Phosphorus, total

Order No: 2005010069

COC No: 41186

SAMPLE INFORMATION

SAMPLE NO: 3 Collection Date:01/06/2005 Time:08:45: Sample Location: Site 3 Lost River Tater Rd.

Collected By: Client Sample Matrix: Storm Water

0.014

Sample Type:Grab

01/06/2005 SM4500-NO2

108826

Special Instructions:

WET CHEMISTRY

			DETECTION	V	DATE	QC	
PARAMETER	RESULT	UNITS	LIMIT	ANALYST	ANALYZED	METHOD	ID NO
Ammonia nitrogen	0.077	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	2.10	mg/L	0.010	JHW	01/06/2005	SM4500-NO3	108818
Nitrogen, nitrite	0.012	mg/L	0.010	JHW	01/06/2005	SM4500-NO2	108826

SAMPLE INFORMATION

SAMPLE NO: 4 Collection Date:01/06/2005 Time:08:15: Sample Location: Site 4 Lost River

Collected By: Client

Sample Matrix: Storm Water Sample Type: Grab

Special Instructions:

Nitrogen, nitrite

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	I ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	2700 B32	/100ml	100	CMB	01/06/2005	EPA 1103.1	602438
		ME	TALS				
PARAMETER	RESULT	UNITS	DETECTION LIMIT	N ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.256	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.364	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
		WET CI	HEMISTRY				
PARAMETER	RESULT	UNITS	DETECTION LIMIT	N ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.118	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	1.77	mg/L	0.010	JHW	01/06/2005	SM4500-NO3	108818

mg/L

0.010 JHW

ND = None Detected

REFERENCE INDEX SA = See Attached SC = See Footer Index

B32 The E. Coli. Result is an estimated count.

FOOTER INDEX

041165 Environmental Consultants, Inc. COC#: Stamp Here For Lab Use Only 391 Newman Ave Order Number #: Clarksville, IN 47129 Client #: Ouote #: Fax #: (812) 282-8554 Phone #: (812) 282-8481 Chain of Custody Record Cell phone #: Client Contact: V-3 Consultants Fax #: Phone #: 7325 Janes Avenue Address: Zip Code: 40517 Īl P.O. #: Project #: Woodridge State: City: Test Sample Collection Sample Grab (G) Container Date Sample Matrix or Comp (C) Temp(°C) Requested Time Collected Number Number Sample Location / ID E-Coli NO3, NO2, NH3, T.Phos. Dis. Phos. 1/5/05 08:30 3 Dry Bed ديا 5,te 5 100W EGII, NO, NO, NH3, T. Phos, D. Phos 3 1/5/05 09:30 w Wesley Chapel Gulf E. Gli, NO3, NO2, NH3, T. Phos, D. Phos 6 8 3 112:00 w 1/5/05 5768 E.GI, NOS, NOS, NILS, T. Plas, D.Phos G True Rise Lost River 3 10:30 ω 1/5/05 15th 9 E. Coli NO. NO. NH. T. Ro, D. Pos 6 5.te 10 Lost River Changelletty 3 12:30 1/5/05 W Remarks: ☐ Yes \square No Is this a compliance sample(s): Time: 13:54 Date: 15/05 m & pm Sampled By: (Printed) Ed Belmonte (Signature) Date: 1-5-05 1354 Casul Time: ann or put (Signature): ARIEL. Received By: (Printed) Time: ann or pen Date: (Signature): Received By: (Printed) Time: ann or pon Date: (Signature): Received By: (Printed) ink = ink

Matrix Abbreviations: DW = Drinking water WW = Wastewater

SW - Serface water

PW = Process water

STR = Stoom water

GW = Ground water POT = Potable water CW = Cooling water S = SolidFoul = Foul off

P = Pool

AIR - Air Particulate SL = SindecsPC = Paint chips

WP = Wines

SOL = Solventa A = Animal Fat I = Impenger Fluid T = Transform oil/Fuild LW = Liquid waste SDW = Solid waste PT = Paint

WO = Wasto/used oil

Soil - Soil L = Liquid Oil = Oil

Systems - Sample Receiving Chain of Custody - General Mar-04

Environmental Consultant	s. Inc	3.					COC#			<u></u>		_
391 Newman Ave	,					For Lab Us	e Only		Stamp Hen	9		- ·
Clarksville, IN 47129	•				Order N	umber#:] .
Phone #: (812) 282-8481 Fax #: (81	2) 282-	8554			Client #:			Quote #:				_
1,	,		Chain c	of Custo	ody Re	ecord					·	7
Client: V-3 Consultants	-			-	Client C	ontact:		· 1	Cell phone #	<u> </u>		4
Address: 7325 Janes Avenue					Phone #:			Fax #:				4
City: Woodridge	State:	Il.	Zip Code:	40517	P.O. #:			Project #:				
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770			Date Collected	Collection Time	Matrix	Grab (G) or Comp (C)	Sample Temp(°C)			nested		
Sample Location / ID	Number					1		_			haa Di	Phos
Site South Pork Lost River	<u>LRI</u>	3	1/6/05	09:45	<u>u</u>	G	E-Col	NO3,	NO2, NI	13, T.P	nos. Di	s. Phos.
Site 2 Carters Creek	<u> </u>	3	1/6/05	09:15	w	G			NO3, NO			
5te 3 Lost River Tater Rd	∠R3	3	1/6/05	08:45	W	<u> </u>		E. Coli	, NOS,NO	2,NH3,	-PXos,I	3. Pros.
Ste 4 Lost River Fisher's Food	LR4	3	1/6/05	06:15	W	G		E.Colij	NO3, M	Z, NH3,	T. PXUS,	s. Phos.
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Remarks:											III NI	4
						•	Is this a c	ampliance	sample(s):	Yes Please cha	cit one	
Sampled By: (Printed) Ed Belmont			(Signature):	C.		selp_	Date: 04	06/05	Time: //	<u>।</u> । २	(m) dr pu	<u>n</u>
(ckel	(Signature):	KIR	Then	- The		6/05		112	spa or pa	n.
	<u></u>	<u></u>	(Signature):	700			Date:		Time:		ann or p	
Received By: (Printed)			(Signature):				Date:		Time:		am or p	m.
Received By: (Printed) Matrix Abbreviations: DW = Drinking water WW = Wastewater STR = Storm water GW = Ground water WYT = Proble water	CW = Cox S = Solid Feat = Feat	oling water	AIR = Air P SL = Shodge PC = Paint o WP = Wines	articulate s chips	SOL = Sol A = Anana I = Impena T = Transi	d Fat	LW = Liquid SDW = Solid PT = Paint WO = Waste	i waste	Ink = Ink Soil = Soil L = Liquid		nple Receivin Indy - Genera	

WP = Wipes

POT = Potable water

PW = Process water

P = Pool



LABORATORY REPORT

V-3 Consultants 7325 Janes Avenue Woodridge, IL 40517

Attn: Mr. Ed Belmonte

Date Received: 06/29/2004 Report Date: 07/12/2004

Client Number: 002076 Order No: 2004060671

P.O. No.:

Project:

Released By:

Order No: 2004060671

COC No: 38132

ANALYTICAL RESULTS

Page 1

SAMPLE INFORMATION

SAMPLE NO: 1 Collection Date:06/29/2004 Time:08:30: Sample Location: Site 1 South Fork 350 N. LR1

Collected By: Client

Sample Matrix: Surface Water Sample Type:Grab

Special Instructions:

		BACTERI	OLOGY				
PARAMETER	RESULT	UNITS	ETECTION LIMIT	N ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	6300 84	/100mL	100	CMB	06/29/2004	EPA 1103.1	602117
		FIELD 7	ESTS				
PARAMETER	RESULT	UNITS D	ETECTION LIMIT	N ANALYST	DATE ANALYZED	METHOD	QC ID NO
Specific Conductance	389	umhos/cm	1	JHW	06/29/2004	EPA 120.1	108268
		META	ALS				
PARAMETER	RESULT	D UNITS	ETECTION LIMIT	N ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.033	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509338
Phosphorus, total	0.039	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509337
		WET CHE	MISTRY				
PARAMETER	RESULT	UNITS	ETECTION		DATE	METHOD	QC

PARAMETER	RESULT	UNITS	DETECTION LIMIT		DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.850	mg/L	0.01	JHW	06/29/2004	EPA 350.3	108264
Nitrogen, Total Kjeldahl	1.68	mg/L	0.010	JHW	06/30/2004	EPA 351.3	108261
Nitrogen, nitrate	11.9	mg/L	0.010	JHW	06/29/2004	SM4500-NO3	108309
Nitrogen, nitrite	0.044	mg/L	0.010	JHW	06/29/2004	SM4500-NO2	108266
pH	7.82	SU		JHW	06/29/2004	EPA 150.1	108262

COC No: 38132

ANALYTICAL RESULTS

Page 2

SAMPLE INFORMATION

SAMPLE NO: 2 Collection Date:06/29/2004 Time:08:40: Sample Location: Site 2 Carters Creek Tater Rd. LR2

Collected By: Client

Sample Matrix: Surface Water Sample Type:Grab

Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT		UNITS	ETECTIO		DATE	METHOD	QC
FAINAME (EX	MESSE		UNITO	LIIVIII	MINALISI	ANALYZED	METHOD	ID NO
Escherichia Coliform	440	B4.	/100mL	10	CMB	06/29/2004	EPA 1103.1	602117

FIELD TESTS

		DETECTION				DATE		QC
PARAMETER	RESULT	UNITS	LIMIT	j.	ANALYST	ANALYZED	METHOD	ID NO
Specific Conductance	437	umhos/cm		1	JHW	06/29/2004	EPA 120.1	108268

METALS

			QC			
RESULT	UNITS	LIMIT	ANALYST	ANALYZED	METHOD	ID NO
0.038	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509338
0.041	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509337
	10,000,000	RESULT UNITS 0.038 mg/L	RESULT UNITS LIMIT 0.038 mg/L 0.010	0.038 mg/L 0.010 TLH	RESULT UNITS LIMIT ANALYST ANALYZED 0.038 mg/L 0.010 TLH 07/01/2004	RESULT UNITS LIMIT ANALYST ANALYZED METHOD 0.038 mg/L 0.010 TLH 07/01/2004 EPA 200.7

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT		DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.567	mg/L	0.01	JHW	06/29/2004	EPA 350.3	108264
Nitrogen, Total Kjeldahl	0.980	mg/L	0.010	JHW	06/30/2004	EPA 351.3	108261
Nitrogen, nitrate	7.83	mg/L	0.010	JHW	06/29/2004	SM4500-NO3	108309
Nitrogen, nitrite	0.022	mg/L	0.010	JHW	06/29/2004	SM4500-NO2	108266
pH	8.08	SU		JHW	06/29/2004	EPA 150.1	108262

SAMPLE INFORMATION

SAMPLE NO: 3 Collection Date:06/29/2004 Time:08:50: Sample Location; Site 3 Lost River Tater Rd. LR3

Collected By: Client

Sample Matrix: Surface Water Sample Type:Grab

Special Instructions:

	and the second second		D	ETECTIO	N	DATE		QC
PARAMETER	RESULT		UNITS	LIMIT	ANALYST	ANALYZED	METHOD	ID NO
Escherichia Coliform	310	84	/100mL	10	CMB	06/29/2004	EPA 1103.1	602117

ANALYTICAL RESULTS

Page 3

SAMPLE INFORMATION

SAMPLE NO: 3 Collection Date:06/29/2004 Time:08:50: Sample Location: Site 3 Lost River Tater Rd. LR3

Collected By: Client Sample Matrix: Surface Water Sample Type:Grab

Special Instructions:

FIELD TESTS

		DE	TECTIO	N	DATE		QC
PARAMETER	RESULT	UNITS	LIMIT	ANALYST		METHOD	ID NO
Specific Conductance	433	umhos/cm	1	JHW	06/29/2004	EPA 120.1	108268

METALS

C. F. C. Sandan and A. Sandan			QC				
PARAMETER	RESULT	UNITS	LIMIT	ANALYST	ANALYZED	METHOD	ID NO
Phosphorus, dissolved	0.028	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509338
Phosphorus, total	0.032	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509337

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT		DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.624	mg/L	0.01	JHW	06/29/2004	EPA 350.3	108264
Nitrogen, Total Kjeldahl	0.840	mg/L	0.010	JHW	06/03/2004	EPA 351.3	108261
Nitrogen, nitrate	10.0	mg/L	0.010	JHW	06/29/2004	SM4500-NO3	108309
Nitrogen, nitrite	0.033	mg/L	0.010	JHW	06/29/2004	SM4500-NO2	108266
pH	7.96	SU		JHW	06/29/2004	EPA 150.1	108262

SAMPLE INFORMATION

SAMPLE NO: 4 Collection Date:06/29/2004 Time:09:10: Sample Location: Site 4 Lost River Fishers Ford LR4

Collected By: Client Sample Matrix: Surface Water Sample Type Grab

Special Instructions:

BACTERIOLOGY

DETECTION			DATE	QC	
UNITS	LIMIT	ANALYST		METHOD	ID NO
/100mL	10	CMB	06/29/2004	EPA 1103.1	602117
	Section 1997	Control of the second	STATE OF THE PARTY	UNITS LIMIT ANALYST ANALYZED	UNITS LIMIT ANALYST ANALYZED METHOD

FIELD TESTS

		DETEC	TION	DATE		oc.
PARAMETER	RESULT	UNITS LIM	T ANAL	YST ANALYZED	METHOD	ID NO
Specific Conductance	422	umhos/cm	1 JHW	06/29/2004	EPA 120.1	108268

ANALYTICAL RESULTS

Page 4

SAMPLE INFORMATION

SAMPLE NO: 4 Collection Date:06/29/2004 Time:09:10: Sample Location: Site 4 Lost River Fishers Ford LR4

Collected By: Client Sample Matrix: Surface Water Sample Type:Grab

Special Instructions:

METALS

	DETECTION DATE						QC
PARAMETER	RESULT	UNITS	LIMIT	ANALYST	ANALYZED	METHOD	ID NO
Phosphorus, dissolved	0.020	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509338
Phosphorus, total	0.027	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509337

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT		DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.678	mg/L	0.01	JHW	06/29/2004	EPA 350.3	108264
Nitrogen, Total Kjeldahl	1.12	mg/L	0.010	JHW	06/30/2004	EPA 351.3	108261
Nitrogen, nitrate	9.71	mg/L	0.010	JHW	06/29/2004	SM4500-NO3	108309
Nitrogen, nitrite	0.036	mg/L	0.010	JHW	06/29/2004	SM4500-NO2	108266
pH	7.70	SU		JHW	06/29/2004	EPA 150.1	108262

SAMPLE INFORMATION

SAMPLE NO: 5 Collection Date:06/29/2004 Time:10:00: Sample Location: Site 7 Wesley Chapel Gulf LR7

Collected By: Client Sample Matrix: Surface Water Sample Type:Grab

Special Instructions:

BACTERIOLOGY

		D	ETECTION	N	DATE		QC
PARAMETER	RESULT	UNITS	LIMIT	ANALYST		METHOD	ID NO
Escherichia Coliform	60	/100mL	10	CMB	06/29/2004	EPA 1103.1	602117
		FIELD 1	TESTS				

		DETECTION			DATE	OC	
PARAMETER	RESULT	UNITS	LIMIT	ANALYS	ANALYZED	METHOD	ID NO
Specific Conductance	429	umhos/cm		1 JHW	06/29/2004	EPA 120.1	108268

METALS

		DETECTION			DATE	QC	
PARAMETER	RESULT	UNITS	LIMIT	ANALYST	ANALYZED	METHOD	ID NO
Phosphorus, dissolved	0.062	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509338
Phosphorus, total	0.074	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509337

Order No: 2004060671

COC No: 38132

Page 5

SAMPLE INFORMATION

SAMPLE NO: 5 Collection Date:06/29/2004 Time:10:00: Sample Location: Site 7 Wesley Chapel Gulf LR7

Collected By: Client Sample Matrix: Surface Water Sample Type:Grab

Special Instructions:

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT		DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.524	mg/L	0.01	JHW	06/29/2004	EPA 350.3	108264
Nitrogen, Total Kjeldahl	0.980	mg/L	0.010	JHW	06/30/2004	EPA 351.3	108261
Nitrogen, nitrate	7.03	mg/L	0.010	JHW	06/29/2004	SM4500-NO3	108309
Nitrogen, nitrite	0.013	mg/L	0.010	JHW	06/29/2004	SM4500-NO2	108266
рН	7.36	SU		JHW	06/29/2004	EPA 150.1	108262

SAMPLE INFORMATION

SAMPLE NO: 6 Collection Date:06/29/2004 Time:10:20: Sample Location: Site 9 Lost River True Rise LR9

Collected By: Client Sample Matrix: Surface Water Sample Type:Grab

Special Instructions:

Nitrogen, nitrate

Nitrogen, nitrite

pH

6.28

0.014

7.47

		BACTER	IOLOGY				
PARAMETER	RESULT	UNITS	ETECTION LIMIT	N ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	710 B4	/100mL	10	CMB	06/29/2004	EPA 1103.1	602117
		FIELD	TESTS				
PARAMETER	RESULT	UNITS	ETECTION LIMIT	N ANALYST	DATE ANALYZED	METHOD	QC ID NO
Specific Conductance	439	umhos/cm	1	JHW	06/29/2004	EPA 120.1	108268
		MET	ALS				
PARAMETER	RESULT	UNITS	ETECTION LIMIT	N ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.064	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509338
Phosphorus, total	0.087	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509337
		WET CHE	MISTRY				
PARAMETER	RESULT	UNITS	ETECTION LIMIT	N ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.500	mg/L	0.01	JHW	06/29/2004	EPA 350.3	108264
Nitrogen, Total Kjeldahl	0.700	mg/L	0.010	JHW	06/30/2004	EPA 351.3	108261
5000							

0.010 JHW

0.010 JHW

JHW

06/29/2004 SM4500-NO3

06/29/2004 SM4500-NO2

06/29/2004 EPA 150.1

108309

108266

108262

mg/L

mg/L

SU

ANALYTICAL RESULTS

Page 6

SAMPLE INFORMATION

SAMPLE NO: 7 Collection Date:06/29/2004 Time:10:10: Sample Location: Site 10 Lost River Orangevill Rd. LR-10

Collected By: Client Sample Matrix: Surface Water Sample Type:Grab

Special Instructions:

BACTERIOLOGY

			D	ETECTION	V	DATE		QC
PARAMETER	RESULT		UNITS	LIMIT	ANALYST		METHOD	ID NO
Escherichia Coliform	1030	B4	/100mL	10	CMB	06/29/2004	EPA 1103.1	602117

FIELD TESTS

		DE	TECTIO	N	DATE		oc
PARAMETER	RESULT	UNITS	LIMIT	ANALYS		METHOD	ID NO
Specific Conductance	465	umhos/cm	1	JHW	06/29/2004	EPA 120.1	108268

METALS

			DETECTION	DATE		QC	
PARAMETER	RESULT	UNITS	LIMIT	ANALYST	ANALYZED	METHOD	ID NO
Phosphorus, dissolved	0.062	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509338
Phosphorus, total	0.077	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509337

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT		DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.488	mg/L	0.01	JHW	06/29/2004	EPA 350.3	108264
Nitrogen, Total Kjeldahl	0.840	mg/L	0.010	JHW	06/30/2004	EPA 351.3	108261
Nitrogen, nitrate	6.60	mg/L	0.010	JHW	06/29/2004	SM4500-NO3	108309
Nitrogen, nitrite	0.017	mg/L	0.010	JHW	06/29/2004	SM4500-NO2	108266
pH	7.58	SU		JHW	06/29/2004	EPA 150.1	108262

REFERENCE INDEX

ND = None Detected SA = See Attached SC = See Footer Index

FOOTER INDEX

Fecal Coliform PRESENCE CONFIRMED by EC Broth.

B4

Environmental Consultants, Inc. COC# 391 Newman Ave Stamp Here For Lab Use Only Clarksville, IN 47129 Order Number #: Phone #: (812) 282-8481 Fax #: (812) 282-8554 Client #: Ouote #: Chain of Custody Record V-3 Consultants Client: Client Contact: Cell phone #: 7325 Janes Avenue Address: Phone #: Fax #: Woodridge City: Il. Zin Code: 40517 P.O. #: State: Project #: Sample | Container Collection Sample Date Grab (G) Sample Test Sample Location / ID Number Number Collected Time Matrix or Comp (C) Temp(°C) Requested South Fork 350 N 5:1=1 6/29/04/08:30 ZR I G \mathbf{u}_{J} E-Col NO3, NO2, NH3, T.Phos. Dis. Phos. E-Gli, NOs, NOS, NHS, T. Phos. DaPhos pH. Conducti Site 2 Cortex's Creek Tarler Rd 3 **4**82 6/29/04/08:40 5 w Site 3 Lost River Total Rd 3 483 E-Coli, NO, NO, NH, T. Plas, Dis Pas, pH, Cond. 6/24/04/08:50 G W Site4 Lost River Fishers Food 3 **LR4** 42404 100:10 E-Coli, NO, MO, NH3, T. Phos., Dis. Phos, PH, Cond. G $\boldsymbol{\omega}$ 3 5/127 Wesley Chapel Gulf 622/64 10:00 G W F-Col: NO. Nos, NH3, T. Phos., Die. Phos. PH. Site 9 Lost River True Rise 3 10:20 6 w E-Coli, No. Nos. NH2, T. Phos., Dis. Phos. PH, Cond. STR10 Koof River Orangeille Rd KR10 3 6/29/04 11:10 6 $\boldsymbol{\omega}$ E-COT, NO3, NO2, NH3, T. Phos., Do. Phos. PH, Com Remarks: ☐ Yes ☐ Please check one Is this a compliance sample(s): Wells Sampled By: (Printed) (Signature): Date: Time: and or per Received By: (Printed) Tucker. (Signature): Date: ं 47ime: am of pm Received By: (Printed) (Signature): Date: Time: aim or par Received By: (Printed) (Signature): Date: Time: arm or pun Matrix Abbreviations: DW = Drinking water CW = Cooling water AIR = Air Particulate SOL = Solvents LW = Liquid waste Ink = Ink WW = Wastewater STR = Storm water S = SolidSL = Sludges A = Animal Fat SDW = Solid waste Soil = Soil Systems - Sample Receiving SW = Surface water GW = Ground water Feul = Feul oil PC = Paint chins I = Impenger Finid PT = Paint L = Liquid Chain of Custody - General PW = Process water POT = Potable water P = Pool WP = Wipes T = Transform oil/Fuild WO = Wasto/used oil

Oil = Oil

Mar-04



LABORATORY REPORT

V-3 Consultants 7325 Janes Avenue Woodridge, IL 40517

Attn: Mr. Ed Belmonte

Date Received: 06/30/2004 Report Date: 08/03/2004

Client Number: 002076

Order No: 2004060706

P.O. No.:

Project:

Released By:

Order No: 2004060706

COC No: 38232

ANALYTICAL RESULTS

Page 1

SAMPLE INFORMATION

SAMPLE NO: 1 Collection Date: 06/30/2004

Time: 10:30: Sample Location:

Site 6 Tolliver Swallow Hole

Collected By: Client

Surface Water Sample Matrix:

Sample Type: Grab

Special Instructions:

FIELD TESTS

	[DETECTIO		DATE		QC
RESULT	UNITS	LIMIT	ANALYS	T ANALYZED	METHOD	ID NO
432	umhos/c	1	JHW	06/30/2004	EPA 120.1	108269
	MET	ALS	- 			
RESULT	UNITS	DÉTECTIC LIMIT		DATE T ANALYZED	METHOD	QC ID NO
0.054	mg/L	0.010	TLH	07/07/2004	EPA 200.7	509341
0.064	mg/L	0.010	TLH	07/07/2004	EPA 200.7	509341
	WET CH	EMISTRY				
RESULT	UNITS	LIMIT LIMIT		DATE ST ANALYZED	METHOD	QC 1D NO
1.02	mg/L	0.01	JHW	07/01/2004	EPA 350.3	108265
1.40	mg/L	0.010	JHW	06/30/2004	EPA 351.3	108261
0.864	mg/L	0.010	JHW	06/30/2004	SM4500-NO3	108337
<0.010	mg/L	0.010	JHW	06/30/2004	SM4500-NO2	108267
7.30	SU		BKE	06/30/2004	EPA 150.1	1010677
	432 RESULT 0.054 0.064 RESULT 1.02 1.40 0.864 <0.010	### RESULT UNITS ### 432 umhos/c ### MET RESULT UNITS 0.054 mg/L 0.064 mg/L WET CH ### RESULT UNITS 1.02 mg/L 1.40 mg/L 0.864 mg/L <0.010 mg/L	RESULT UNITS LIMIT 432 umhos/c 1 METALS DETECTION RESULT UNITS LIMIT 0.054 mg/L 0.010 0.064 mg/L 0.010 WET CHEMISTRY DETECTION RESULT UNITS LIMIT 1.02 mg/L 0.01 1.40 mg/L 0.010 0.864 mg/L 0.010 <0.010 mg/L 0.010	### ### ### ### ### ### ### ### ### ##	RESULT UNITS LIMIT ANALYST ANALYZED	RESULT UNITS LIMIT ANALYST ANALYZED METHOD

Environmental Consultant	s, Inc	> .					COC#:				
91 Newman Ave	•					For Lab Use			Stamp Here	⊣ ·	
Clarksville, IN 47129					Order Nu	mber#: 👌	<u>004 (</u>	<u> </u>)6-1		
Phone #: (812) 282-8481 Fax #: (81	2) 282-	8554			Client #:			Quote#:	·	_i	
1010 11. (0.2) 200		C	Chain o	f Custo	ody Re	cord			<u> </u>	_	
Client: V-3 Consultants					Client Co	ntact:	.		Cell phone #:	ᅴ	
Address: 7325 Janes Avenue					Phone #:			Fax #:			
City: Woodridge	State:	Il	Zip Code:	40517	P.O. #:		<u>.</u>	Project #:			
	_	Container	Ī	Collection	_	Grab (G)	Sample		Test Requested		
Sample Location / ID	Number		Collected		T .	or Comp (C)				$\overline{}$	Dhos
Site 6 Tolliver Smallow Hole	ZR6	ユ	6/30/04	10:30	w	G	عسون		NO2, NH3, T.Phos.	J1.5.	Pnos
						1		PH	and Conductivity	_	
	 	 	<u> </u>							ţ	
	 	 	<u> </u>	<u> </u>			 -			_	
			<u> </u>		ļ					.	
	,				-]		_	
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		<u> </u>	<u> </u>		<u> </u>	<u> </u>	 		· · · · · · · · · · · · · · · · · · ·	_	
		1		<u> </u>	<u> </u>						
	<u>. </u>				<u></u>			·			
Remarks:							Is this a	compliance	sample(s):		
			 -				Dote: (130/04	Time: 41.00 am o	r pen	
Sampled By: (Printed) Wally Levernier				Velly	\sim		Date:	130/04	Time: 400 amo	r pan	
Received By: (Printed) JUNY CACIE	<u> </u>		(Signature)		J GNI	<u></u> .	Date:	<u> </u>	Time: am o	pm	
Received By: (Printed)			(Signature)				Date:		Time: am o	r pm.	
Received By: (Printed) Matrix Abbreviations: DW = Drinking water WW = Wastewater STR = Storm water SW = Surface water GW = Ground water PM = Process water POT = Potable water	CW = Co S = Solid Feul = Fe P = Pool		(Signature) AIR = Air P SL = Shudge PC = Paint (WP = Wipe	articulate es chips	SOL = Sol A = Anim I = Impen T = Trans	el Fat	LW = Liqui SDW = Soli PT = Paint WO = Wast	d waste	Ink = Ink Soil = Soil Systems - Sample Rece L = Liquid Chain of Custody - Gen Oil = Oil Mar-04	iving eral	

PW = Process water

APPENDIX V:

IDEM DATA

Site Information

SubBasin: Lower East Fork White

14 digit HUC: 05120208150030

LSite: WEL150-0007

Site: Lost River

Location: 425 N

County: Orange

Latitude: 38 37 25.989

Longitude: -86 20 26.120

Ecoregion: Interior Plateau

IASNatRegion: 10A DrainageArea (sq.miles): **Topo:** I-33 Segment: 77 35

Gradient (ft/mile): 10.35

Sample

SampleNumber: AA11724

EventID: 02544

SampleMediumCollected:

Macro + FishComm + FishTiss

SampleDate: 8/6/2002 WaterFlowType: Pool

SurveyCrewChief: SLS

SampleTime:

12:29:00 PM HydroLabNumber: BSS-4

WaterAppearance: Clear

SkyConditions:

Scattered AirTemperature: 76-85

WindDirection: East (90 degrees)

WindStrength: Light

DissolvedO2 (mg/l): 8.649 pH: 7.53 WaterTemp (°C): 24.75 SpecificConductivity (µS/cm):

Turbidity (NTU): 13

SpecialNotes:

ElectrofishingEquipment: Backpack

Voltage: 200

Avg.StreamWidth (m): 11.8 DistanceFished (m):

195

SecondsFished: 2008

WaterDepthAvg (m): 0.3

WaterDepthMax (m): 0.5 TimeAtSite: 3:30

BridgeInReach:

ReachRepresentative:

WhyReachNotRepresentative:

SpecialComments:

Habitat

TotalScore (max100): 70 SubstrateScore (max20): 15 InstreamCoverScore (max20): 14 ChannelMorphologyScore (max20): 16

RiparianZone&BankErosionScore(max10): 6 Pool/GlideQualityScore (max12): 6 Riffle/RunScoreQuality (max8): 3 GradientScore (max10): 10 %Pool 50

%Riffle: 15

%Run: 35 %Glide: 0

CanopyCoverPctOpen: 60.06

SubjectiveRating: 7

AestheticRating: 7 **NOTES:**

Fish Community Index of Biotic Integrity (IBI)

Inf			

Actual Observ	ation	Metric Score	Actual Observation		Metric Score
SpeciesCount:	15	3	SensitiveSpeciesCount:	5	3
Darter/Madtom/SculpinSpeciesCount:	2	0	%TolerantIndividuals:	12.9	5
DarterSpeciesCount:	1	3	%OmnivoreIndividuals:	8.4	5
%LargeRiverIndividuals:	0.0	0	%InsectivoreIndividuals:	36.6	3
% Headwater Individuals:	4.0	0	%PioneerIndividuals:	55.5	0
SunfishSpeciesCount:	4	5	%CarnivoreIndividuals:	9.3	5
CentrarchidaeSpeciesCount:	5	0	Total #of Individuals(CPUE):	760	5
MinnowSpeciesCount:	6	0	CPUElessGizzardShads:	760	0
SuckerSpeciesCount:	1	3	%SimpleLithophilicInd.:	15.0	1
RoundBodySuckerSpeciesCount:	1	0	%Ind.withDeformities,	0.0	5
SalmonidaeSpeciesCount:	0	0	ErodedFins,Lesions,&Tumors:		

Metrics are dependent on Ecoregion and Drainage Area. Metrics can score a 1, 3, or 5 depending on calibration.

TotalIBIScore

(min 6=nofish):

max=60

46

SampleNumber: AA1172 StreamName: Lost River	EventID: 02544 LS	ite: WEL150-0 LocationDesci		County 425 N	: Orange	
Common Name	Individual Fish Count	Deformities	Eroded Fins	Lesions	Tumors	Multiple Anomalies
Bluegill	28	0	0	0	0	0
Bluntnose Minnow	64	0	0	0	0	0
Central Stoneroller	315	0	0	0	0	0
Creek Chub	32	0	0	0	0	0
Green Sunfish	1	0	0	0	0	0
Hornyhead Chub	35	0	0	0	0	0
Longear Sunfish	29	0	Ō	0	0	0
Mottled Sculpin	30	0	0	0	0	0
Northern Hogsucker	9	0	0	0	0	0
Orangethroat Darter	10	0	0	0	0	0
Redfin Shiner	40	0	0	0	0	0
Rock Bass	28	0	0	0	0	0
Smallmouth Bass	43	0	0	0	0	0
Striped Shiner	95	0	0	0	0	0
Yellow Bullhead	1	0	0	0	0	0

Site Information

SubBasin: Lower East Fork White

14 digit HUC: 05120208150010

LSite: WEL150-0008

Site: S Fk Lost River

Location: Vernon School Rd

County: Washington

Latitude: 38 35 27

Longitude: -86 15 42

IASNatRegion: 10A

Topo: I-33

Segment: 96

Ecoregion: Interior Plateau

DrainageArea (sq.miles):

Gradient (ft/mile): 21.16

Sample

SampleNumber: DA10864

EventID: 97064

SampleMediumCollected:

Water + FishComm

SampleDate: 9/9/1997

SurvevCrewChief: SDH

SampleTime:

3:00:00 PM HydroLabNumber: 4

WaterFlowType:

WaterAppearance:

SkyConditions:

AirTemperature:

WindDirection:

WindStrength:

DissolvedO2 (mg/l): 6.44 pH: 7.83 WaterTemp (°C): 19.57 SpecificConductivity (µS/cm):

420

Turbidity (NTU): 23.4

SpecialNotes:

ElectrofishingEquipment: Backpack

Voltage: 300 WaterDepthAvg (m): 0.4

Avg.StreamWidth (m): 4.8

DistanceFished (m):

75

SecondsFished: 971

WaterDepthMax (m): 0.6

TimeAtSite: 1:15

BridgeInReach:

ReachRepresentative:

WhyReachNotRepresentative:

SpecialComments:

Habitat

SubstrateScore (max20): 14 InstreamCoverScore (max20): 18 ChannelMorphologyScore (max20): 16 TotalScore (max100):

RiparianZone&BankErosionScore(max10): 7 Pool/GlideQualityScore (max12): 6 Riffle/RunScoreQuality (max8): 3

GradientScore (max10): 8

%Pool 70

% Riffle: 20

NOTES:

%Run: 10 %Glide: 0

(min 6=nofish):

CanopyCoverPctOpen: 1

AestheticRating: 8 SubjectiveRating: 8

Fish Community Index of Biotic Integrity (IBI) Information

Imormanon

Actual Observat	ion	Metric Score	Actual Observation		Metric Score
SpeciesCount:	9	3	SensitiveSpeciesCount:	4	5
Darter/Madtom/SculpinSpeciesCount:	1	1	%TolerantIndividuals:	31.7	3
DarterSpeciesCount:	1		%OmnivoreIndividuals:	0.0	5
%LargeRiverIndividuals:			%InsectivoreIndividuals:	53.7	5
%HeadwaterIndividuals:	0.0	1	%PioneerIndividuals:	41.5	3
SunfishSpeciesCount:	3		%CarnivoreIndividuals:	9.8	
CentrarchidaeSpeciesCount:			Total #of Individuals(CPUE):	41	1
MinnowSpeciesCount:	4	3	CPUElessGizzardShads:		
SuckerSpeciesCount:	0		%SimpleLithophilicInd.:	17.1	1
RoundBodySuckerSpeciesCount:			%Ind.withDeformities,	0.0	1
SalmonidaeSpeciesCount:			ErodedFins,Lesions,&Tumors:		
			TotalIBIScore 32		

Metrics are dependent on Ecoregion and Drainage Area. Metrics can score a 1, 3, or 5 depending on calibration.

max=60

SampleNumber: DA1086 StreamName: S Fk Lost River	EventID: 97064 LS	ite: WEL150-0 LocationDesc			: Washing School Rd	gton
Common Name	Individual Fish Count	Deformities	Eroded Fins	Lesions	Tumors	Multiple Anomalies
Bluegill	2	0	0	0	0	0
Creek Chub	13	0	0	0	0	0
Hornyhead Chub	5	0	0	0	0	0
Longear Sunfish	7	0	0	0	0	0
Orangethroat Darter	4	0	0	0	0	0
Redfin Shiner	1	0	0	0	0	0
Rock Bass	3	0	0	0	0	0
Smallmouth Bass	1	0	0	0	0	0
Striped Shiner	3	0	0	0	0	0
Sunfish Hybrid	2	0	0	0	0	0

SiteID: WEL150-0007

USGS Hydrologic

05120208150030

Stream Name: Lost River

County Orange

Description:

425 N

Latitude: 38 37 25. Longitude: -86 20 26.12

Sample Date:

8/6/2002

Lab ID #: 826563-001 Mean Length (mm)

Fish Sample Number: AA11724-077-01

7 central stoneroller

Mean Weight 28

Whole

(121 129

- 150)

46) (23

		Result		Reporting Limit	<u>Metho</u>
Lipids		8.17	%	0.1	EnChemSVO-59
Solids		30.2	%	0.1	SM2540G
Cadmium	<	-1		36.538461538461	6020
Lead		70	ug/Kg ww	67.307692307692	6020
Mercury	<	-1		45.045045045045	6020
Aroclor	<	-1		50	8082
Aroclor 1016	<	-1		50	8082
Aroclor 1221	<	-1		50	8082
Aroclor 1232	<	-1		50	8082
Aroclor 1242	<	-1		50	8082
Aroclor 1248	<	-1		50	8082
Aroclor 1254	<	-1		50	8082
Aroclor 1260	<	-1		50	8082

Sample Date:

8/6/2002

Lab ID #: 826563-001

Fish Sample Number: AA11724-077-01

SiteID: WEL150-0007 USGS Hydrologic 05120208150030 Stream Name: Lost River County Orange

Description: 425 N **Latitude:** 38 37 25. **Longitude:** -86 20 26.12

 Sample Date:
 8/6/2002
 Lab ID #:
 826562-009
 Fish Sample Number:
 AA11724-156-01

 5 rock bass
 Mean Length (mm)
 Mean Weight

Skin-On Fillets, Scaleless

180 (153 - 201)

Result

Reporting Limit

Metho

	i i	Result		Reporting Limit	<u>Metho</u>
Lipids	-	0.835	%	0.1	
Solids		20.9	%	0.1	SM2540G
Cadmium	<	-1	. 	38	6020
Lead		-1		70	6020
Mercury		230	ug/Kg ww	42.735042735042	6020
2,4'-DDD	<	-1	-3-3	5	
2,4'-DDE		-1		5	8081
2,4'-DDT		-1		5	
4,4'-DDD		-1		Ę	8081
4,4'-DDE		-1			5 8081
4,4'-DDT		-1			8081
Aldrin		-1		2.5	5 8081
Alpha-BHC		-1		2.5	5 8081
Beta-BHC		-1		2.5	5 8081
Chlordane, Alpha-		-i		2.5	5 8081
and I I all	<	-1		2.9	5 8081
	<	-1		2.	5 8081
Dieldrin		-1		!	5 8081
Endosulfan I	<	-1		2.	5 8081
Endosulfan II	<	-1			5 8081
Endosulfan Sulfate	<	-1			5 8081
	<	-1			5 8081
Endrin Aldehyde	<	-1			5 8081
Endrin Ketone	<	-1			5 8081
Gamma-BHC (Lindane)	<	-1		2.	
Heptachlor		-1		2.	
Heptachlor Epoxide	<	-1		2.	5 8081
Methoxychlor	<	-1		2	
Nonachlor, cis-	<	-1			5 8081
Nonachlor, trans-	<	-1			5 8081
		-1			5 8081
Pentachloroanisole		-1		2.	5 8081
Toxaphene		-1		25	
Hexachlorobenzene		-1		2.	
Aroclor		-1			0 8082
Aroclor 1016		-1			0 8082
Aroclor 1221	<	-11			0 8082
Aroclor 1232		-1			0 8082
Aroclor 1232 Aroclor 1242		-1			0 8082
Aroclor 1248		-1			0 8082
Aroclor 1254		-1			0 8082
Aroclor 1260		-1			0 8082
9/6/2002	Lah ID #•	82656	2-009	Fish Sample Number:	AA11724-156-01

Sample Date: 8/6/2002 Lab ID #: 826562-009 Fish Sample Number: AA11724-156-01

SiteID: WEL160-0019

USGS Hydrologic

05120208160060

Stream Name: Patoka Reservoir

County Orange

Description: PATOKA RIVER

Latitude: 38 31 50 Longitude: -86 34 10

Sample Date:

7/10/1996

Lab ID #: 61200783

Fish Sample Number: 61200783

2 largemouth bass Skin-On Fillets, Scaleless Mean Length (mm) 327

- 330)

Mean Weight 412

(397

426)

Skin-On	Fillets, Scaleless	321	(324	- 330) 412 (397 - 420)
			Result		Reporting Limi	t <u>Metho</u>
	Lipids		0.54	%		
	Cadmium	В	34.3	ug/Kg ww		
	Lead	В	22.3	ug/Kg ww		
	Mercury		634	ug/Kg ww		
	2,4'-DDD	<	-1	ug/Kg ww	11	0
	2,4'-DDE	<	-1	ug/Kg ww	11	0
	2,4'-DDT	<	-1	ug/Kg ww	2	0
	4,4'-DDD	<	-1	ug/Kg ww	1	O
	4,4'-DDE	<	-1	ug/Kg ww	2	0
	4,4'-DDT	<	-1	ug/Kg ww	2	0
	Aldrin	<	-1	ug/Kg ww		8
	Alpha-BHC	<	-1	ug/Kg ww		8
	Beta-BHC	<	-1	ug/Kg ww		8
	Chlordane, Alpha-	<	-1	ug/Kg ww		8
	Chlordane, Gamma-	<	-1	ug/Kg ww		8
	Delta-BHC	<	-1	ug/Kg ww		8
	Dieldrin	<	-1	ug/Kg ww		0
	Endosulfan I	<	-1	ug/Kg ww		0
	Endosulfan II	<	-1	ug/Kg ww		0
	Endosulfan Sulfate	<	-1	ug/Kg ww	2	0
	Endrin	<	-1	ug/Kg ww	1	0
	Endrin Aldehyde	<	-1	ug/Kg ww		0
	Endrin Ketone	<	-1	ug/Kg ww	1	0
	Gamma-BHC (Lindane)	<	-1	ug/Kg ww		8
	Heptachlor	<	-1	ug/Kg ww		8
	Heptachlor Epoxide	<	-1	ug/Kg ww		8
	Methoxychlor	<	-1	ug/Kg ww	2	0
	Nonachlor, cis-	<	-1	ug/Kg ww		8
	Nonachlor, trans-	<	-1	ug/Kg ww		6
	Oxychlordane	<	-1	ug/Kg ww		8
	Pentachloroanisole	<	-1	ug/Kg ww	1	6
	Toxaphene		-1	ug/Kg ww		0
	Hexachlorobenzene	<	-1	ug/Kg ww		0
	Total PCBs	<	-1	ug/Kg ww	5	0
Sample Date:	7/10/1996	Lab ID #:	612007	783	Fish Sample Number:	61200783

SiteID: WEL150-0008

USGS Hydrologic

05120208150010

Stream Name: S Fk Lost River

County Washington

Description:

Vernon School Rd

Latitude: 38 35 27 Longitude: -86 15 42

Sample Date: 9/9/1997

Lab ID #: 974252021

Fish Sample Number: 974252021 **Mean Weight**

3	creek chub
	Whole

Mean Length (mm) **169** (162 - 173)

			100000000000000000000000000000000000000
47	(42	-	50)

	, ,		,		
	Res			Reporting Limit	<u>Metho</u>
Lipids	3.	38	%		
Solids	19	9.4	%		
Cadmium	<	-1	ug/Kg ww	20	
Chromium	B 1	00	ug/Kg ww		
Copper	N 16	80	ug/Kg ww		
Lead	11	30	ug/Kg ww		
Mercury	<	-1	ug/Kg ww	40	
Nickel		-1	ug/Kg ww	180	
Zinc	213		ug/Kg ww		
2,4'-DDD		-1	ug/Kg ww	10	
2,4'-DDE		-1	ug/Kg ww	20	
2,4'-DDT		-1	ug/Kg ww	20	
4,4'-DDD		-1	ug/Kg ww	10	
4,4'-DDE	<	-1	ug/Kg ww	20	
4,4'-DDT	<	-1	ug/Kg ww	20	
Aldrin	<	-1	ug/Kg ww	8	
Alpha-BHC	<	-1	ug/Kg ww	8	
Beta-BHC	<	-1	ug/Kg ww	8	
Chlordane, Alpha-	<	-1	ug/Kg ww	8	
Chlordane, Gamma-	<	-1	ug/Kg ww	8	
Delta-BHC	<	-1	ug/Kg ww	. 8	
Dieldrin		-1	ug/Kg ww	10	
Endosulfan I		-1	ug/Kg ww	20	
Endosulfan II		-1	ug/Kg ww	20	
Endosulfan Sulfate		-1	ug/Kg ww	20	
Endrin		-1	ug/Kg ww	10	
Endrin Aldehyde		-1	ug/Kg ww	10	
Endrin Ketone		-1	ug/Kg ww	10	
Gamma-BHC (Lindane)		-1	ug/Kg ww	8	
Heptachlor		-1	ug/Kg ww	8	
Heptachlor Epoxide	<	-1	ug/Kg ww	8	
Methoxychlor	<	-1	ug/Kg ww	20	
Nonachlor, cis-	<	-1	ug/Kg ww		
Nonachlor, trans-	<	-1	ug/Kg ww	16	
Oxychlordane	<	-1	ug/Kg ww	8	
Pentachloroanisole		-1	ug/Kg ww	16	
Toxaphene	<	-1	ug/Kg ww	20	
Hexachlorobenzene		-1	ug/Kg ww	10	
Total PCBs		-1	ug/Kg ww	50	
1-Methylnaphthalene		-1	ug/Kg ww	20	
2-Methylnaphthalene		-1	ug/Kg ww	20	
Acenaphthene		-1	ug/Kg ww	50	
Acenaphthylene		-1	ug/Kg ww	100	
Anthracene		-1	ug/Kg ww	5	
Benzo(a)pyrene		-1	ug/Kg ww	5	
Benzo(g,h,i)perylene	<	-1	ug/Kg ww	10	

Dave // After a readle ama		- 1	ualka was	5
Benzo(k)fluoranthene	<	-1	ug/Kg ww	3
Benzo[a]anthracene	<	-1	ug/Kg ww	5
Benzo[b]fluoranthene	<	-1	ug/Kg ww	10
Chrysene	<	-1	ug/Kg ww	5
Dibenzo[a,h]anthracene	<	-1	ug/Kg ww	10
Fluoranthene	<	-1	ug/Kg ww	7.5
Fluorene	<	-1	ug/Kg ww	10
Indeno[1,2,3-cd]pyrene	<	-1	ug/Kg ww	5
Naphthalene	<	-1	ug/Kg ww	50
Phenanthrene	<	-1	ug/Kg ww	5
Pyrene	~	-1	ua/Ka ww	5

Sample Date: 9/9/1997 Lab ID #: 974252021 Fish Sample Number: 974252021